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NATIONAL DAM INSPECTION PROGRAM. PINE CREEK DAM (NORTH PARK LAK--ETC(U)
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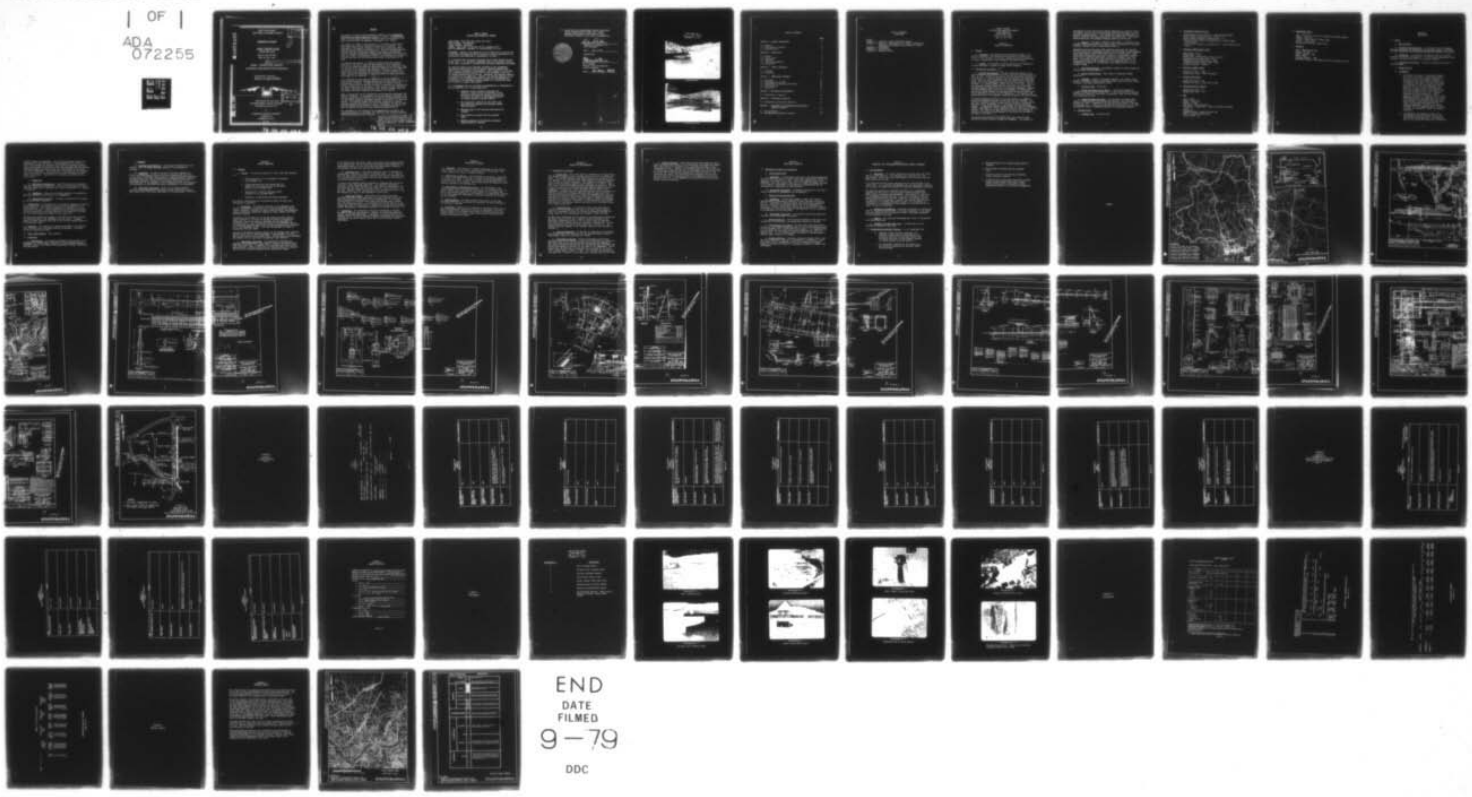

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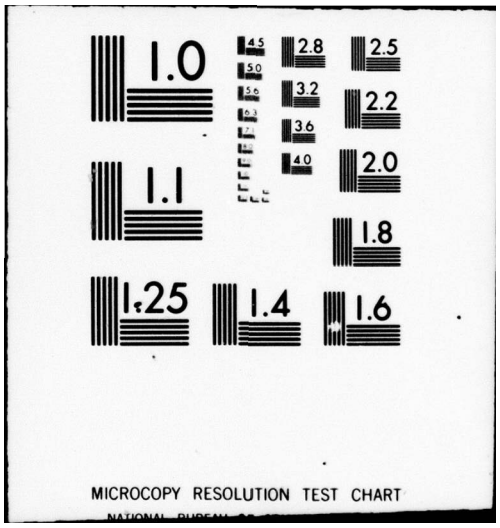
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OHIO RIVER BASIN
PINE CREEK, ALLEGHENY COUNTY

PENNSYLVANIA

PINE CREEK DAM
(North Park Lake)

NDI I.D. NO: PA-467
DER I.D. NO: 2-26

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

D'APPOLONIA CONSULTING ENGINEERS
10 DUFF ROAD
PITTSBURGH, PA. 15235

MAY 1979

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigation and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

(10) Lawrence D. Anderson

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

(15) DACW31-79-C-0014

(11) May 79

(12) 74 p.

(6) National Dam Inspection Program. Pine Creek Dam (North Park Lake) (NDI I.D. Number PA-467, DER I.D. Number 2-26), Ohio River Basin, Pine Creek, Allegheny County, Pennsylvania. Phase I Inspection Report,

job

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Pine Creek Dam (North Park Lake)
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Allegheny
STREAM: Pine Creek, a tributary of the Allegheny River
DATE OF INSPECTION: December 15, 1978 and April 16, 1979

ASSESSMENT: Based on the evaluation of the conditions as they existed on the dates of inspection and as revealed by visual observations, the condition of Pine Creek Dam is considered to be good.

It is reported that the outlet pipe gate has not been operated in the recent past. It is therefore recommended that the operating condition of the outlet pipe gate be evaluated and necessary maintenance performed.

The spillway capacity was evaluated according to the recommended procedure and was found to pass 30 percent probable maximum flood (PMF) without overtopping the embankment. This capacity is less than the recommended spillway capacity of full PMF according to the size and hazard classification of the dam. Therefore, the spillway capacity is classified to be inadequate. However, the spillway capacity is not considered to be seriously inadequate because it is estimated that overtopping of the embankment during passage of 50 percent PMF would not be likely to cause a dam failure.

It is recommended that the following recommendations be implemented as soon as possible or on a continuing basis:

1. Immediate further detailed hydrologic and hydraulic studies should be performed to more accurately ascertain the spillway capacity and the nature and extent of improvements required to provide adequate spillway capacity.

2. The operational condition of the outlet pipe gate should be evaluated and necessary maintenance performed.

3. Missing riprap on the upstream slope should be replaced.

4. Brush should be removed from the upstream slope.

5. Spalling concrete in the spillway discharge channel should be repaired.

6. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert downstream residents in the event of emergencies.

Lawrence D. Andersen

Lawrence D. Andersen, P.E.
Vice President

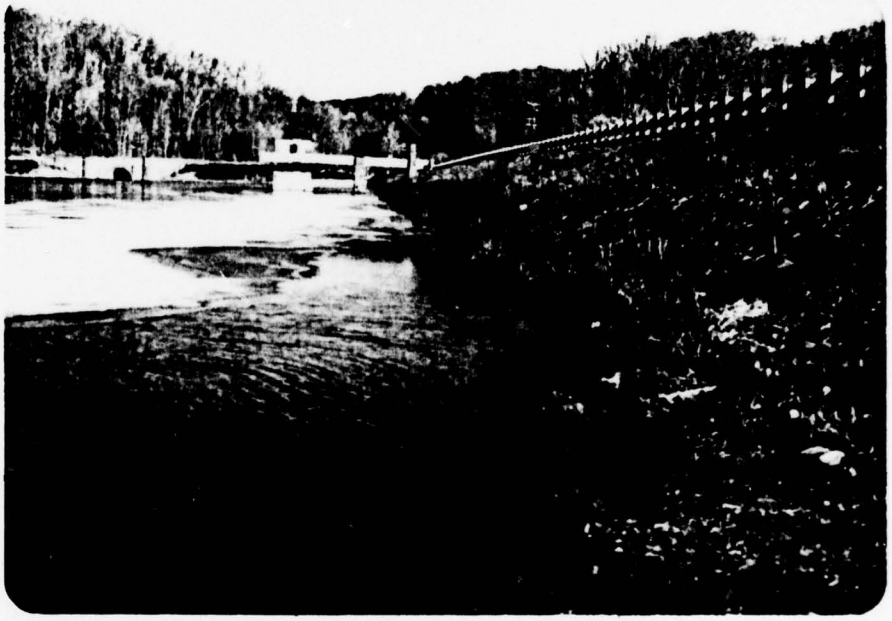
Date: May 3, 1979

Approved By:

G. K. WITHERS
Colonel, Corps of Engineers
District Engineer

DATE: 20 May 1979

PINE CREEK DAM
NDI I.D. NO. PA-467
DECEMBER 15, 1978



Upstream Face

Downstream Face

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NATIONAL DAM INSPECTION PROGRAM
PINE CREEK DAM
(NORTH PARK LAKE)
NDI I.D. NO. PA-467
DER I.D. NO. 2-26

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

ABSTRACT

a. Dam and Appurtenances. The Pine Creek Dam consists of an earth embankment approximately 1130 feet long with a maximum height of about 33 feet. As built, the crest of the dam was 60 feet wide with a 2 horizontal to 1 vertical slope on both the upstream and downstream faces. Over the years, significant fill has been placed on the downstream side of the embankment, increasing the crest width to 300 to 400 feet. A two-lane roadway crosses the crest of the dam. Near the left abutment (looking downstream) the side slope of the spillway discharge channel defines the toe of the present embankment. However, for the remaining major portion of the embankment, no discernible demarcation exists between the embankment and the natural ground that can be identified as the toe of the embankment. Fill placed on the downstream side of the embankment gradually merges to the right abutment.

The flood discharge facilities for the dam consist of a combined primary and emergency spillway located near the left abutment. The spillway structures include an ogee overflow section, circular arc in plan view, which discharges into a rectangular concrete discharge channel. A single-span highway bridge crosses the spillway discharge channel, approximately 70 feet downstream from the crest of the overflow section. The crest of the ogee overflow section of the spillway is located at an elevation approximately 10 feet below the low point on the crest of the dam.

ABSTRACT

The outlet works consist of an intake tower and a 560-foot-long reinforced concrete conduit through the embankment. The conduit is

rectangular in cross section with inside dimensions of 5 feet by 5 feet. The conduit receives flow from the intake tower and discharges into the spillway discharge channel. Flow through the conduit is controlled by a manually operated sluice gate located at the intake tower. This outlet system constitutes the emergency drawdown facility for the dam.

b. Location. The dam is located on Pine Creek, a tributary of the Allegheny River, approximately 10 miles north of Pittsburgh in McCandless Township, Allegheny County, Pennsylvania (Plate 1).

Downstream from the dam, Pine Creek initially flows east for one mile and then turns south, meandering through a narrow valley for approximately three miles where it flows under State Route 8 at Allison Park. Downstream from Allison Park, the stream continues to flow south, crossing State Route 8 numerous times before joining the Allegheny River near Etna. In the last five-mile reach downstream from Allison Park, the stream goes through urban, residential, and commercial areas. It is estimated that failure of the dam would cause large loss of life and property damage.

c. Size Classification. Intermediate (based on 33-foot height and 1950 acre-feet storage capacity).

d. Hazard Classification. High (based on downstream damage potential).

e. Ownership. County of Allegheny (address: Mr. James D. Bell, Director of Parks, Recreation, and Conservation, Room 345, County Office Building, Pittsburgh, Pennsylvania 15219).

f. Purpose of Dam. Recreation.

g. Design and Construction History. The dam was designed by Allegheny County personnel during 1935. It was constructed by Harrison Construction Company of Pittsburgh, Pennsylvania, under the WPA Program with completion in 1936.

h. Normal Operating Procedure. The reservoir is normally maintained at Elevation 960, the uncontrolled spillway crest elevation, leaving 10.3 feet of freeboard to the low spot on the crest of the dam at Elevation 970.3. Inflow occurring when the lake level is at or above the spillway level is discharged through the uncontrolled spillway.

1.3 Pertinent Data

a. Drainage Area - 25 square miles

b. Discharge at Dam Site (cfs)

Maximum known flood at dam site - 600 (estimated 1972)
Outlet conduit at maximum pool - Unknown
Gated spillway capacity at maximum pool - N/A
Ungated spillway capacity at maximum pool - 10,500 (ogee section only)
Total spillway capacity at maximum pool - 10,500 (ogee section only)

c. Elevation (USGS Datum) (feet)

Top of dam - 970.3
Maximum pool - 970.3
Normal pool - 960 (spillway crest elevation)
Upstream invert outlet works - 938.5
Downstream invert outlet works - 936.5
Streambed at center line of dam - 936±
Maximum tailwater - Unknown

d. Reservoir Length (feet)

Normal pool level - 6000
Maximum pool level - 9000 (estimated)

e. Storage (acre-feet)

Normal pool level - 570
Maximum pool level - 1950 (top of dam)

f. Reservoir Surface (acres)

Normal pool level - 75
Maximum pool level - 190

g. Dam

Type - Earth
Length - 1130 feet
Height - 33 feet
Top width - 300 to 400 feet
Side slopes - Downstream: 10H:1V or flatter; Upstream: 2H:1V
Zoning - No
Impervious core - Concrete cutoff wall
Cutoff - Concrete cutoff wall
Grout curtain - No.

h. Regulating Outlet

Type - Five-foot by five-foot reinforced concrete conduit
Length - 570± feet
Closure - Sluice gate at intake tower
Access - Intake tower
Regulating facilities - Sluice gate

i. Spillway

Type - Ogee-crested weir
Length - 83 feet
Crest elevation - 960
Gates - None
Upstream channel - Lake
Downstream channel - Rectangular concrete discharge channel

SECTION 2
DESIGN DATA

2.1 Design

a. Data Available

(1) Hydrology and Hydraulics. A state report entitled, Report Upon the Application of Commissioners of Allegheny County, dated August 22, 1935, summarizes the available hydrologic and hydraulic information.

(2) Embankment. The available information consists of design drawings and various correspondence. The 1935 permit application report includes a detailed description of the design features.

(3) Appurtenant Structures. Available information consists of design drawings.

b. Design Features

(1) Embankment

a. As designed, the dam is a homogeneous embankment with a reinforced concrete cutoff wall on the center line of the original embankment, extending for the full length of the dam. At the bottom of the valley, the core wall starts at Elevation 930, which is about 8 to 10 feet below the base of the earth embankment and extends to a level 7 feet above the normal pool level (Elevation 967). The width of the core wall is shown to be 4 feet 7 inches at Elevation 930, which reduces to 1 foot 6 inches at elevation 967 (Plates 2 and 3). The embankment material is classified to be "select fill" beneath the downstream slope and on the upstream side of the concrete core wall and as "fill" for the remaining portion of the original embankment. The 1935 state report indicates that the embankment was to be placed in layers not exceeding 6 inches and properly compacted.

b. The embankment was designed to have 2 to 1 (horizontal to vertical) slopes on both the upstream and downstream faces. The upstream face of the dam was protected with 15-inch-thick

conduit through the embankment. The reinforced concrete conduit is rectangular in cross section with inside dimensions of 5 feet by 5 feet. Flow through the conduit is controlled by a manually operated sluice gate located at the intake tower and discharges into the spillway discharge channel approximately 500 feet downstream from the center line of the embankment. The intake tower is equipped for the installation of stop logs on the upstream side to permit draining the intake tower when required. Plates 8 and 9 illustrate the details of the outlet works.

c. Design Data

(1) Hydrology and Hydraulics. The 1935 state report indicates that the spillway was designed for a flow of 450 cubic feet per second (cfs) per square mile of drainage area, which corresponded to a capacity of 11,250 cfs.

(2) Embankment. Other than the design drawings, no engineering data are available on the design of the embankment.

(3) Appurtenant Structures. No design calculations are available on the appurtenant structures.

2.2 Construction. The construction of the dam was apparently conducted in accordance with the drawings and specifications prepared by the design engineers. Very limited information is available on the construction of the dam. A state inspection which was conducted shortly after the completion of the dam referred to the condition of the dam as "(the dam) possessed all marks of first class job."

The major post-construction change at the dam site was the filling of the downstream side of the embankment over the years. Allegheny County personnel indicated that most of the fill was placed during the 1950s and early 1960s.

2.3 Operation. The reservoir is normally maintained at the spillway crest elevation by the discharge through the spillway. No formal records of operation are kept.

2.4 Other Investigations. None reported.

2.5 Evaluation

a. Availability. The available information was provided by the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER), and by the Allegheny County Department of Parks, Recreation, and Conservation.

b. Adequacy

(1) Hydrology and Hydraulics. The available information is very limited. Only the design discharge capacity of the spillway is reported.

(2) Embankment. In view of the age of the dam (completed in 1936), the design approach and construction techniques are not likely to have been in conformance with currently accepted engineering practices. Although design lacks such considerations as embankment slope stability and seepage analysis, in view of the extensive fill placed on the downstream side of the embankment, such considerations are not considered to be pertinent to the future structural performance of the embankment.

(3) Appurtenant Structures. Review of the design drawings indicates that as designed no significant design deficiencies existed that should affect the overall performance of the appurtenant structures.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The on-site inspection of Pine Creek Dam consisted of:

1. Visual inspection of the embankment, abutments, and embankment toe.

2. Visual examination of the spillway and its components, the downstream end of the outlet conduit, and the intake tower.

3. Observations of factors affecting runoff potential of the drainage basin.

4. Evaluation of downstream area hazard potential.

The specific observations are illustrated in Plate 10 and in the photographs in Appendix C.

b. Embankment. The general inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features.

In general, the condition of the dam was found to be good, with no signs of distress. The crest of the dam was found to be generally undulating, but with no signs of distress, such as settlement or surficial cracks. The fill material placed on the downstream side of the embankment gradually merges into the natural ground and no definable toe of the embankment exists. This area was searched for signs of seepage and none were found.

The top of the dam was surveyed relative to the spillway crest elevation and was found to be on descending grades on each abutment to a low spot in the vicinity of the outlet works. The low point on the embankment was found to be 10.3 feet above the spillway crest elevation.

c. Appurtenant Structures. The appurtenant structures were examined for deterioration, other signs of distress, and obstructions that would limit flow. In general, the structures were found to be in good condition. Concrete was found to be spalling only in an isolated section of the spillway discharge channel beneath the bridge.

It is reported that the outlet conduit sluice gate has not been operated in the recent past. Due to the siltation problem in the reservoir, the operational condition of the sluice gate was questionable; therefore, the operation of the sluice gate was not observed.

d. Reservoir Area. A map review indicates that the watershed is predominantly covered with suburban residential areas. It is reported that the lake receives significant sediment load from the watershed, and it is estimated that the storage volume has been reduced to one-third of the design storage capacity.

A review of the regional geology (Appendix E) indicates that the dam is situated in Lower Conemaugh formations. The available information indicates that the Upper Freeport coal seam, which is approximately 207 feet below the dam elevation, has been mined to a point just east of the dam site. However, visual observations in the area below the toe of the dam indicated no signs of mine subsidence at this time.

e. Downstream Channel. Downstream from the dam, Pine Creek initially flows east, then turns south, and joins Allegheny River near Etna, Pennsylvania, approximately 10 miles downstream. In the lower six-mile reach of its course, Pine Creek flows through urban, residential, and commercial areas. It is estimated that in the event of a dam failure more than 100 residential or commercial buildings may be affected. Further description of downstream conditions is included in Section 1.2b.

3.2 Evaluation. The condition of the dam is considered to be good. No signs of distress were observed. However, the following conditions require repairs and maintenance: replacement of missing riprap on the upstream face of the dam at several locations, evaluating the operational condition of the outlet conduit sluice gate, and performing necessary maintenance.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. The reservoir is normally maintained at the spillway crest level with excess inflows discharging over the spillway. The outlet conduit sluice gate is normally closed.

4.2 Maintenance of the Dam. The maintenance of the dam is considered to be fair. The crest of the dam is covered with grass and appears to be periodically mowed. At several locations on the upstream face, the riprap was found to be missing. This riprap should be replaced to avoid erosion problems on the upstream face.

4.3 Maintenance of Operating Facilities. The maintenance of the operating facilities is considered to be poor. It is reported that the outlet conduit sluice gate has not been operated in the recent past. Due to the siltation problems in the reservoir, the operational condition of the sluice gate was questionable; therefore, operation of the gate was not observed.

4.4 Warning System. No formal warning system exists for the dam. Telephone communication facilities are available via park buildings in the vicinity of the dam.

4.5 Evaluation. Except for the condition of the outlet conduit sluice gate, the maintenance condition of the dam is considered to be fair. Missing riprap on the upstream slope should be replaced and the operational condition of the outlet conduit sluice gate be evaluated and necessary maintenance performed.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Pine Creek Dam has a watershed of 25 square miles and impounds a reservoir with a surface area of 75 acres at normal pool level. The combined emergency and primary spillway is located on the left abutment. The capacity of the ogee spillway section was determined to be 10,500 cfs with no freeboard. This capacity is slightly lower than the reported design capacity of the spillway of 11,250 cfs, apparently due to different assumed spillway discharge coefficients. The top of the side walls of the spillway discharge channel upstream from the embankment are located at a lower elevation than the crest of the embankment. Although flow over these sections will tend to increase the spillway capacity by providing additional overflow area, this flow entering the discharge channel at a direction perpendicular to the main flow direction from the ogee section will tend to reduce the hydraulic efficiency of the ogee section, thereby tending to reduce the discharge capacity of the spillway. Therefore, for the purpose of this preliminary analysis, the spillway capacity was based on the discharge rating of the ogee section only.

b. Experience Data. As previously stated, Pine Creek Dam is classified as an intermediate size dam in the high hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass full PMF.

The PMF inflow hydrograph for the reservoir was determined utilizing the Dam Safety Version of the HEC-1 computer program developed by the Hydrologic Engineering Center of the U.S. Army, Corps of Engineers. Data used for the computer input are presented in Appendix D. The PMF inflow hydrograph was found to have a peak flow of 29,215 cfs. The computer input and summary of the computer output are also included in Appendix D.

c. Visual Observations. On the date of inspection, no conditions were observed that would indicate that the spillway capacity would be significantly reduced in the event of a flood.

d. Overtopping Potential. Various percentages of PMF inflow hydrograph were routed through the reservoir to determine the percent of PMF inflow that the dam can pass without overtopping the embankment. The computer analyses indicate that the spillway can pass 30 percent PMF without overtopping the low spot on the crest of the embankment. For 50 percent PMF, the dam would be overtopped for a duration of 5.5 hours with a maximum depth of about 1.3 feet. For full PMF, the dam would be overtopped for a duration of 13.0 hours with a maximum depth of 3.8 feet.

e. Spillway Adequacy. Since the spillway cannot pass the recommended spillway design flood of full PMF without overtopping the embankment, the spillway is classified to be inadequate according to the recommended criteria. However, the spillway capacity is not considered to be seriously inadequate because it is estimated that the dam can pass 50 percent PMF without posing a significant breach potential. This conclusion was based on the observation that extensive fill material has been placed on the downstream side of the embankment and that the paving on the crest of the embankment would provide protection against erosion during overtopping.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) Embankment. As discussed in Section 3, the field observations did not reveal any signs of distress that would significantly affect the stability of the dam at this time. Due to the extensive size of the embankment (the crest width is about 10 to 15 times the height over most of its length), conventional slope stability considerations are not considered to be applicable to this structure.

(2) Appurtenant Structures. Structural performance of the appurtenant structures is considered to be satisfactory.

b. Design and Construction Data

(1) Embankment. The dam was designed in 1935, when limited understanding of geotechnical behavior of earth retention structures existed. Consequently, available design and construction information does not provide any quantitative data to aid in the assessment of stability. However, as previously noted, due to the extensive size of the embankent, conventional stability considerations are not considered to be applicable to this structure.

(2) Appurtenant Structures. No design and construction data are available on the appurtenant structures.

c. Operating Records. The structural stability of the dam is not considered to be affected by the operational features of the dam.

d. Post-Construction Changes. The major post-construction modification to the original design consisted of filling the downstream side of the embankment with unclassified fill material. It is reported that over the years the area below the original embankment was used as a disposal area. As it presently exists, the crest of the dam is 300 to 400 feet wide for most of its length.

e. Seismic Stability. The dam is located in Seismic Zone 1, and the static stability of the dam is considered to be adequate. Therefore, based on the recommended criteria for evaluation of seismic stability of dams, the structure is presumed to present no hazard from earthquakes.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that Pine Creek Dam is in good condition. No conditions were observed that would significantly affect the overall performance of the structure and none were reported in the past.

It is reported that the outlet pipe gate has not been operated in the recent past. It is therefore recommended that the operational condition of the outlet pipe gate be evaluated and necessary maintenance performed.

The spillway capacity was evaluated according to the recommended procedure and was found to pass 30 percent probable maximum flood (PMF) without overtopping the embankment. This capacity is less than the recommended spillway capacity of full PMF according to size and hazard classification for the dam. Therefore, the spillway capacity is classified to be inadequate. However, the spillway capacity is not considered to be seriously inadequate because it is estimated that overtopping of the embankment during passage of 50 percent PMF is not likely to cause a dam failure.

b. Adequacy of Information. Available information in conjunction with the visual observations and the previous experience of the inspectors are considered to be sufficient to make a reasonable assessment of the condition of the dam.

c. Urgency. The following recommendations should be implemented on a continuing basis.

d. Necessity for Additional Data. No additional data are considered required at this time.

7.2 Recommendations/Remedial Measures. It is recommended that:

1. Immediate further detailed hydrologic and hydraulic studies should be performed to more accurately ascertain the spillway capacity and the nature and extent of improvements required to provide adequate spillway capacity.

2. The operational condition of the outlet pipe gate should be evaluated and necessary maintenance performed.

3. Missing riprap on the upstream slope should be replaced.

4. Brush should be removed from the upstream slope.

5. Spalling concrete in the spillway discharge channel should be repaired.

6. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert downstream residents in the event of emergencies.

PLATES

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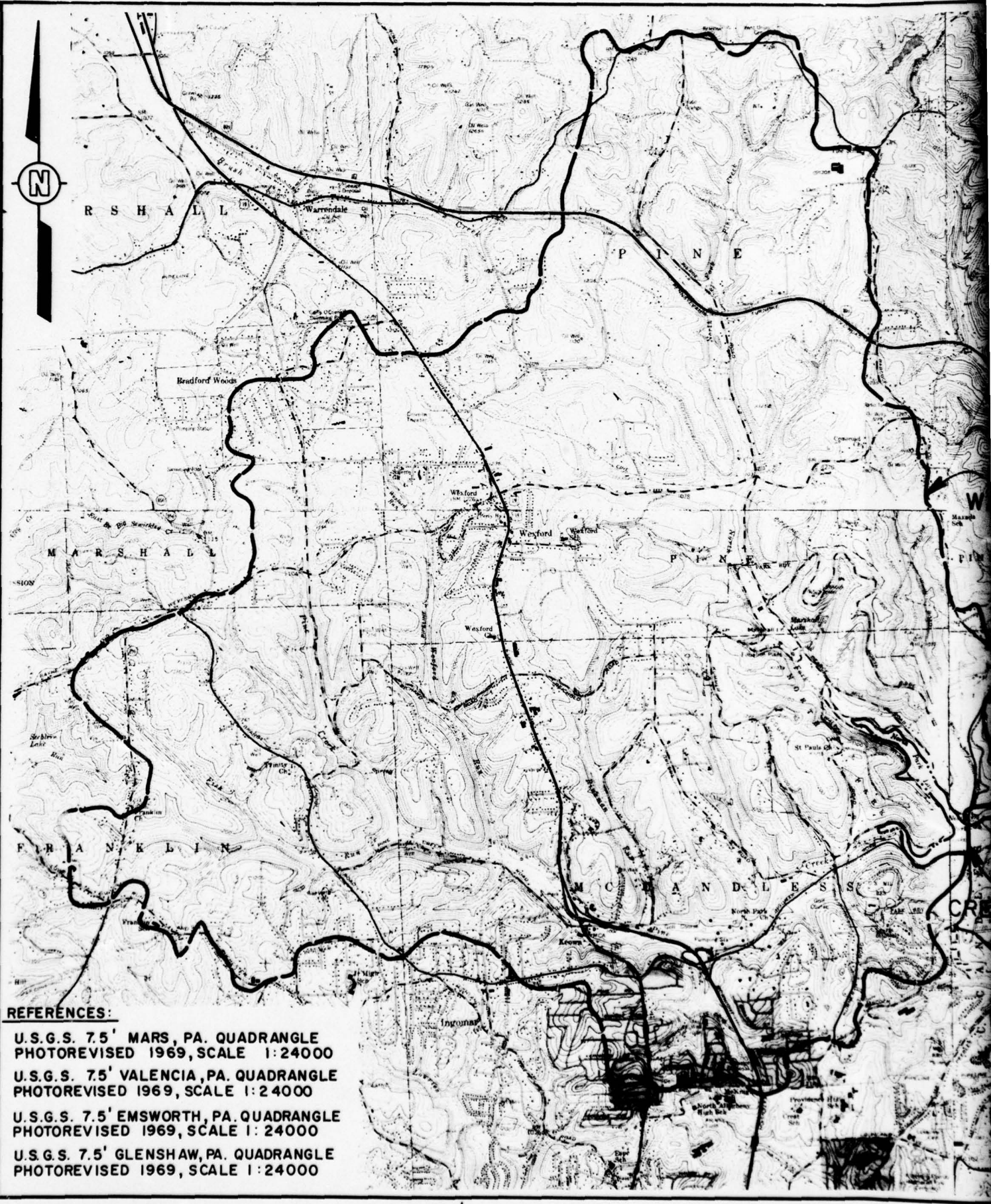

REFERENCES:

U.S.G.S. 7.5' MARS, PA. QUADRANGLE
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U.S.G.S. 7.5' VALENCIA, PA. QUADRANGLE
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U.S.G.S. 7.5' EMSWORTH, PA. QUADRANGLE
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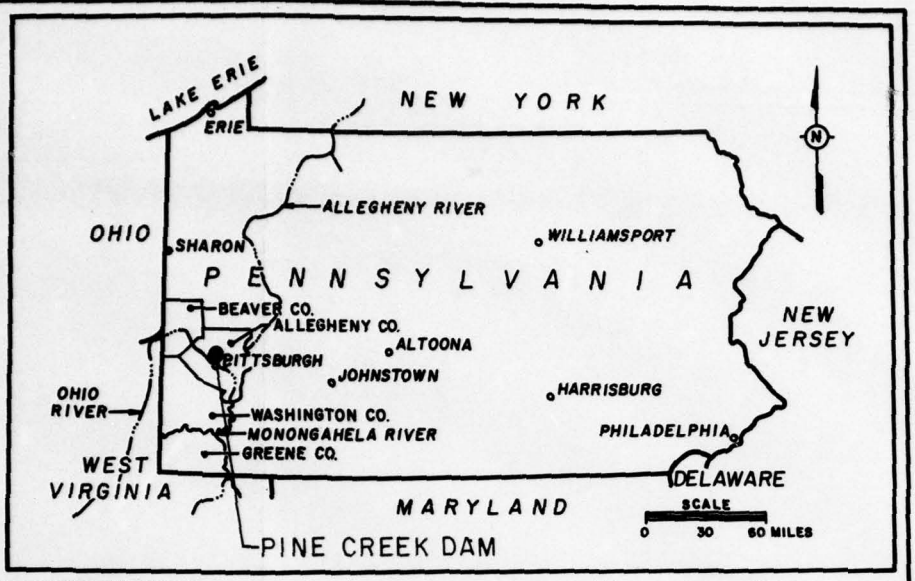

KEY PLAN

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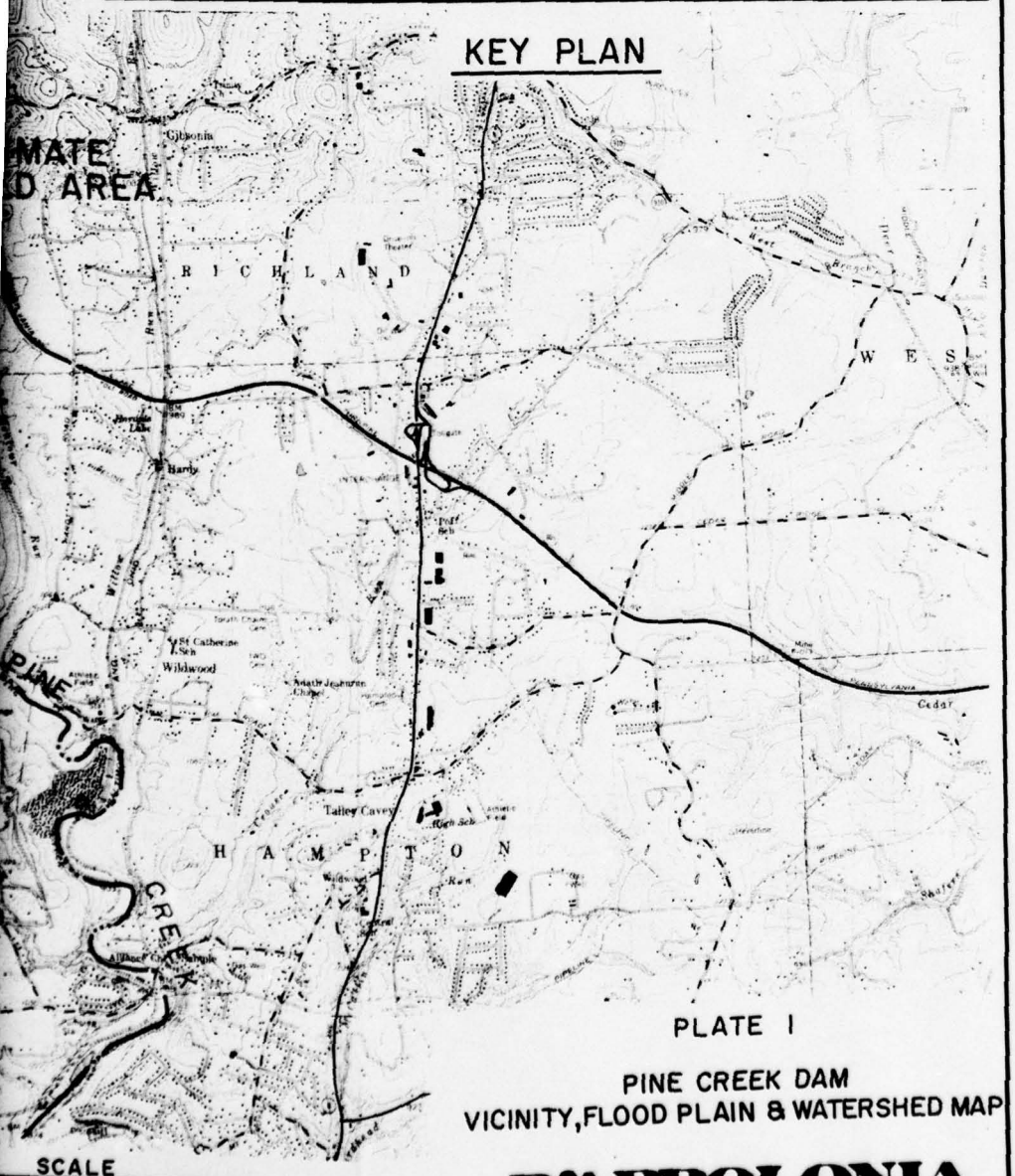

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PLATE I

PINE CREEK DAM
VICINITY, FLOOD PLAIN & WATERSHED MAP

D'APPOLONIA

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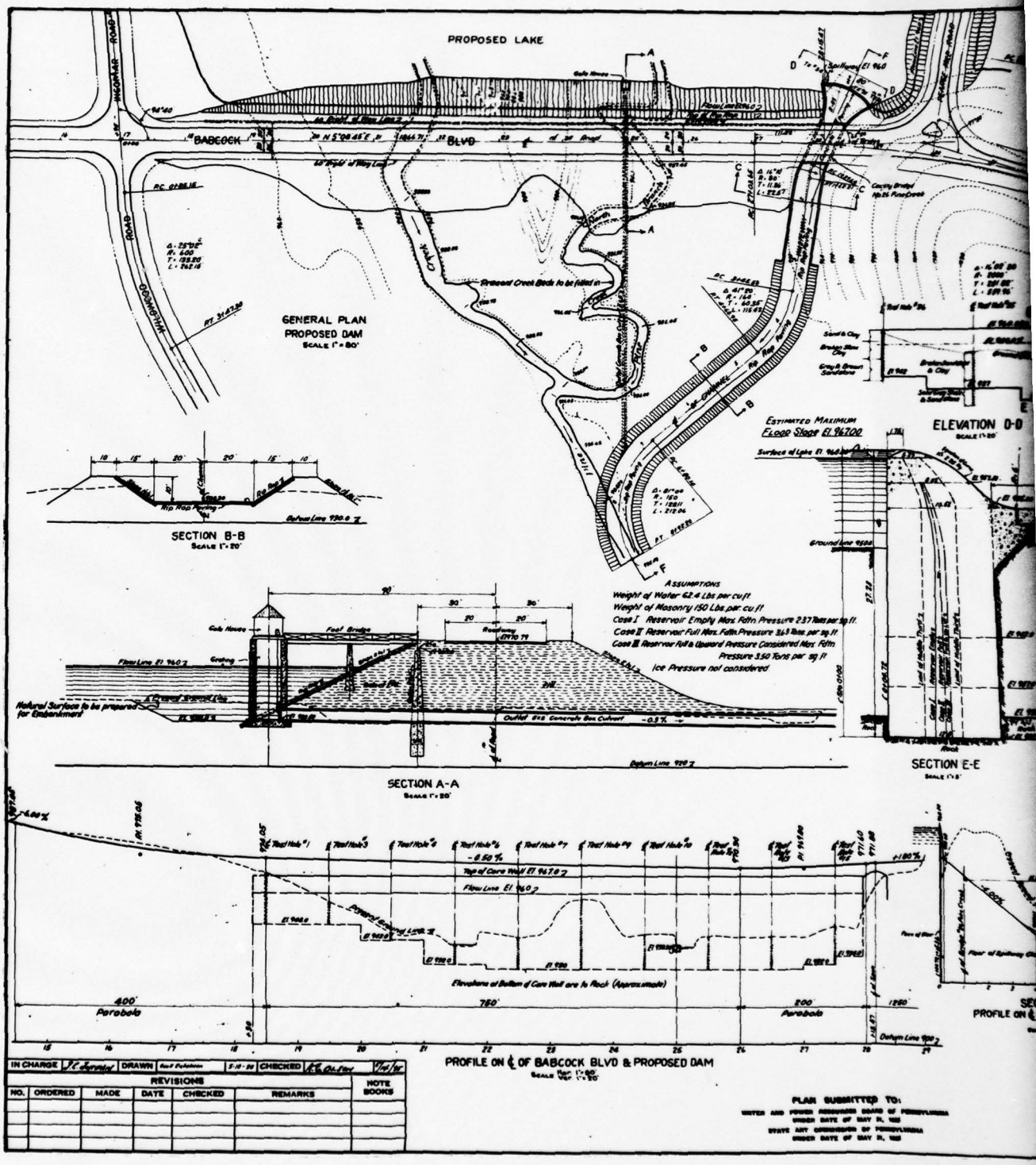
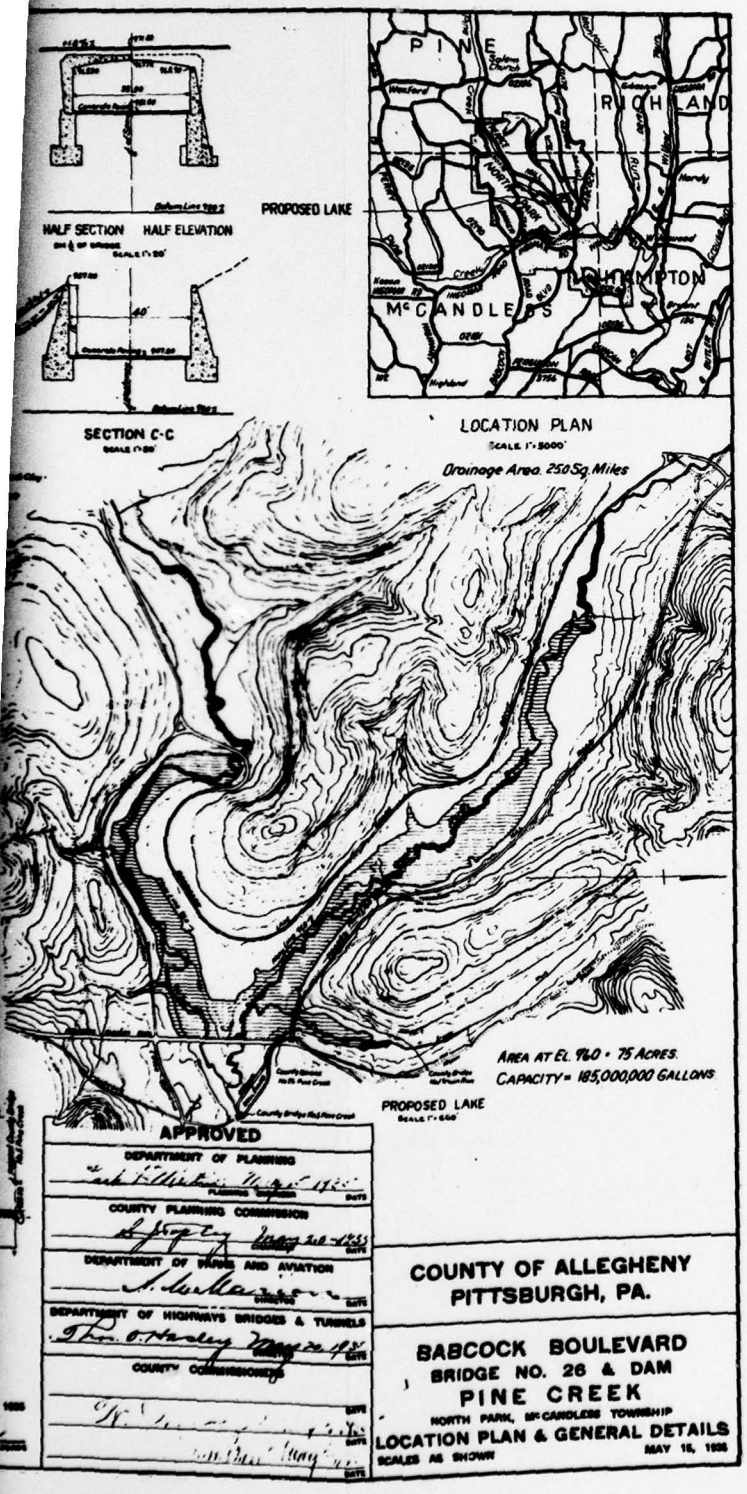


IN CHARGE	J.C. Hensley	DRAWN	Alan F. Pelishek	5-11-78	CHECKED	R.E. Gilfert	5/11/78

REVISIONS

NO.	ORDERED	MADE	DATE	CHECKED	REMARKS	NOTE BOOKS

PLAN SUBMITTED TO:
WATER AND POWER RESOURCES BOARD OF PENNSYLVANIA
UNDER DATE OF MAY 21, 1928
STATE ART COMMISSION OF PENNSYLVANIA
UNDER DATE OF MAY 21, 1928

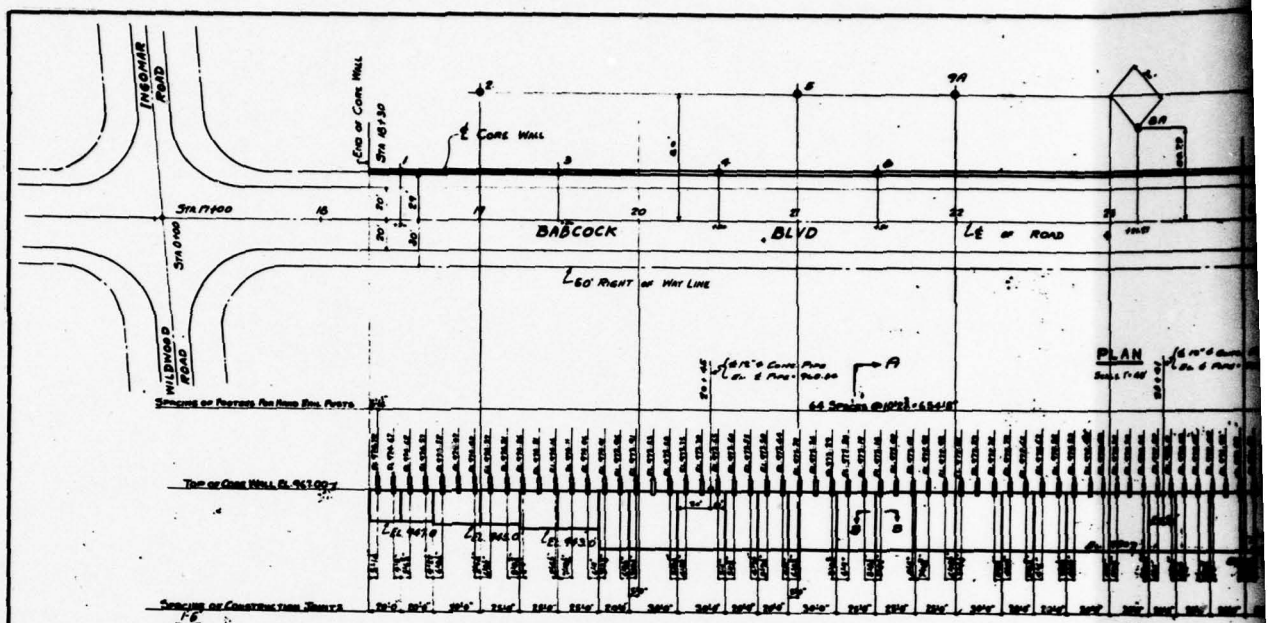


2

PLATE 2

D'APPOLONIA

DRAWN BY	R D B	CHECKED BY	BE	4-17-79	DRAWING NUMBER	78-367-B90
	1-4-79	APPROVED BY				

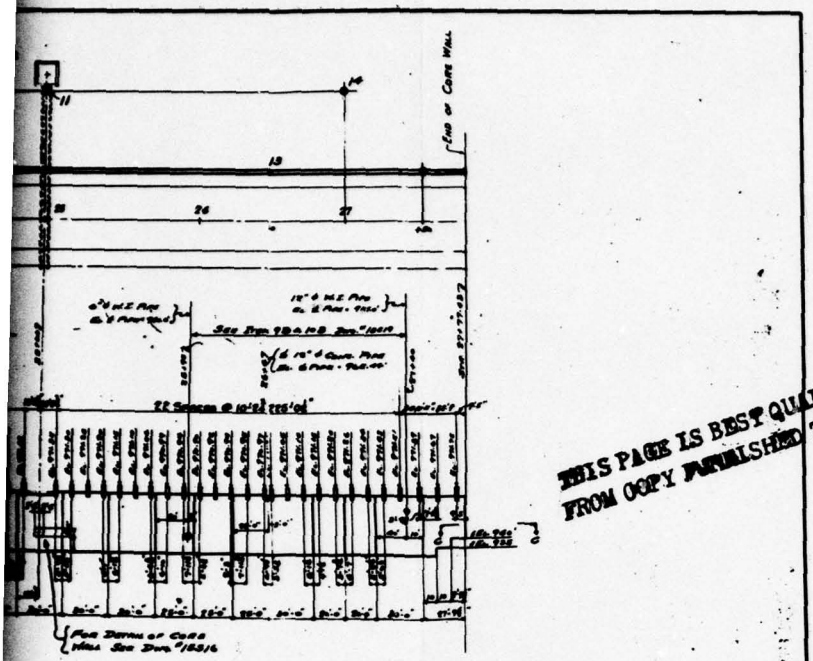


IN CHARGE	A.E. Olson	DRAWN		CHECKED	

REVISIONS

NO.	ORDERED	MADE	DATE	CHECKED	REMARKS

PLAN COMPLETE BUT NOT ENGRAVED



ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
18	CONCRETE IN WALL INCLUDING EXCAVATING	C.Y.	3980
25	REINFORCING STEEL INCLUDING DOWELS & CHAIRS	LBS	140,000
38	PREMOLDED BITUMINOUS EXP. JOINT FILLER	SQ. FT.	500

FOR GENERAL NOTES SEE DWG. 15501

APPROVED
DEPARTMENT OF PLANNING — June 6 1935
COUNTY PLANNING COMMISSION
DEPARTMENT OF PARKS AND AVIATION — 7-9-35
DEPARTMENT OF HIGHWAYS BRIDGES & TUNNELS — July 7, 1935
COUNTY COMMISSIONERS — May 14 '35 — July 1 '35

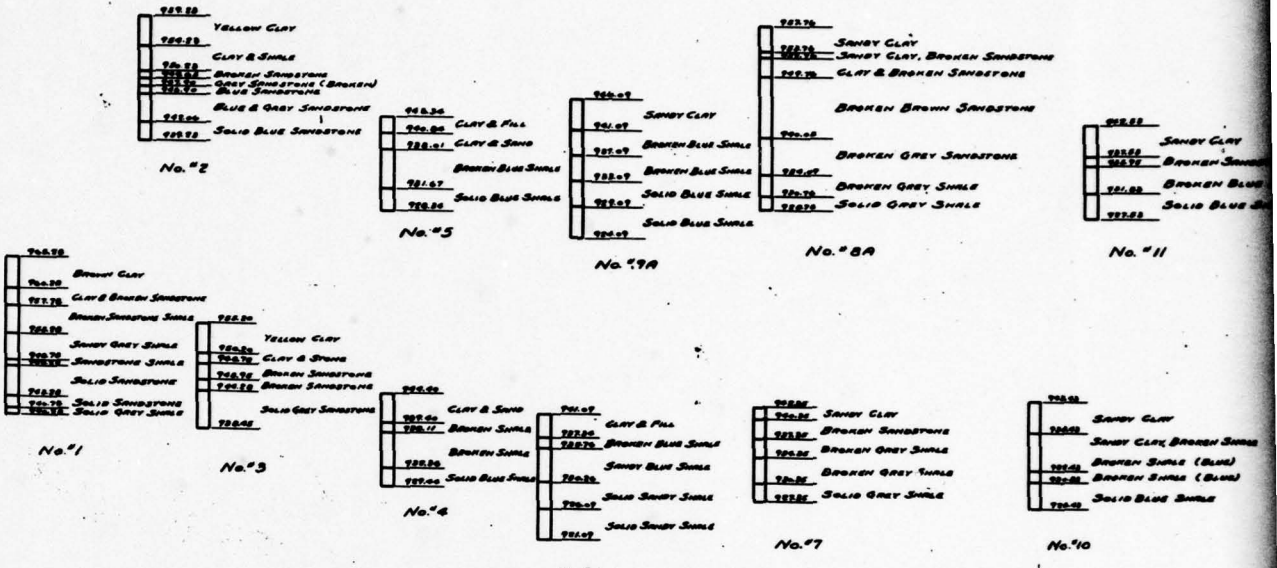
COUNTY OF ALLEGHENY
PITTSBURGH, PA.

BABCOCK BOULEVARD
CORE WALL
NORTH PARK DAM
NORTH PARK, 12th CAROLINE TOWNSHIP
GENERAL PLAN & ESTIMATED QUANTITIES
SCALES AS SHOWN JUNE 6, 1935
SHEET 1 OF 2 SHEETS

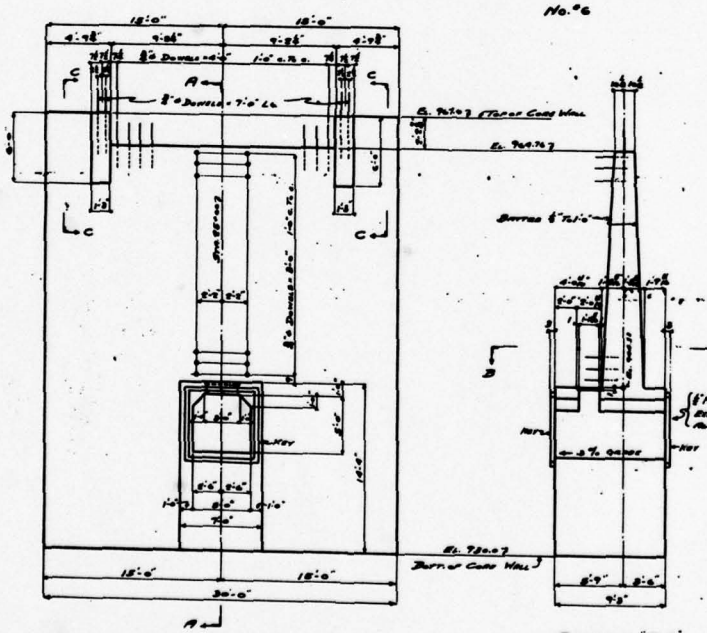
PLATE 3

D'APPOLONIA

DRAWN BY	CHECKED BY		DRAWING NUMBER
RDB	BE	4-17-79	78-367-B91
1-4-79	APPROVED BY		

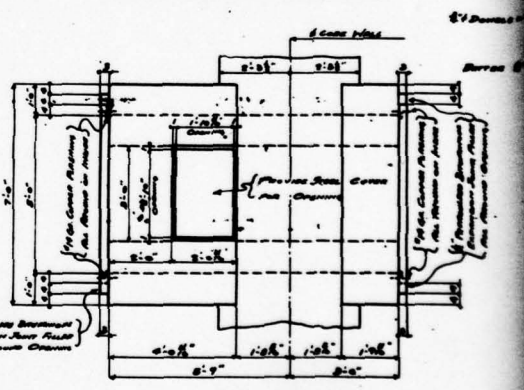


TEST HOLES
SCALE 1"=10'
FOR LOCATION SEE DWG.# 15515



ENLARGED DETAIL OF CONC. WALL AT STA. 88+00
SCALE 1/4"=1'-0"

SECTION "A-A"
SCALE 1/4"=1'-0"



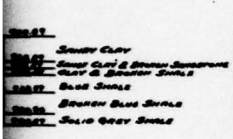
SECTION "B-B"
SCALE 1/4"=1'-0"

IN CHARGE	AC Olsen	DRAWN	JAC	CHECKED	

REVISIONS

NO.	ORDERED	MADE	DATE	CHECKED	REMARKS

No. #14



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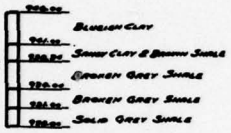

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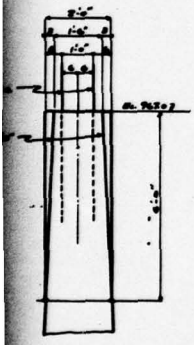


Section C-C
Scale 1"=1'-0"

SUBMITTED JUNE 6, 1958

APPROVED

COUNTY OF ALLEGHENY
PITTSBURGH, PA.

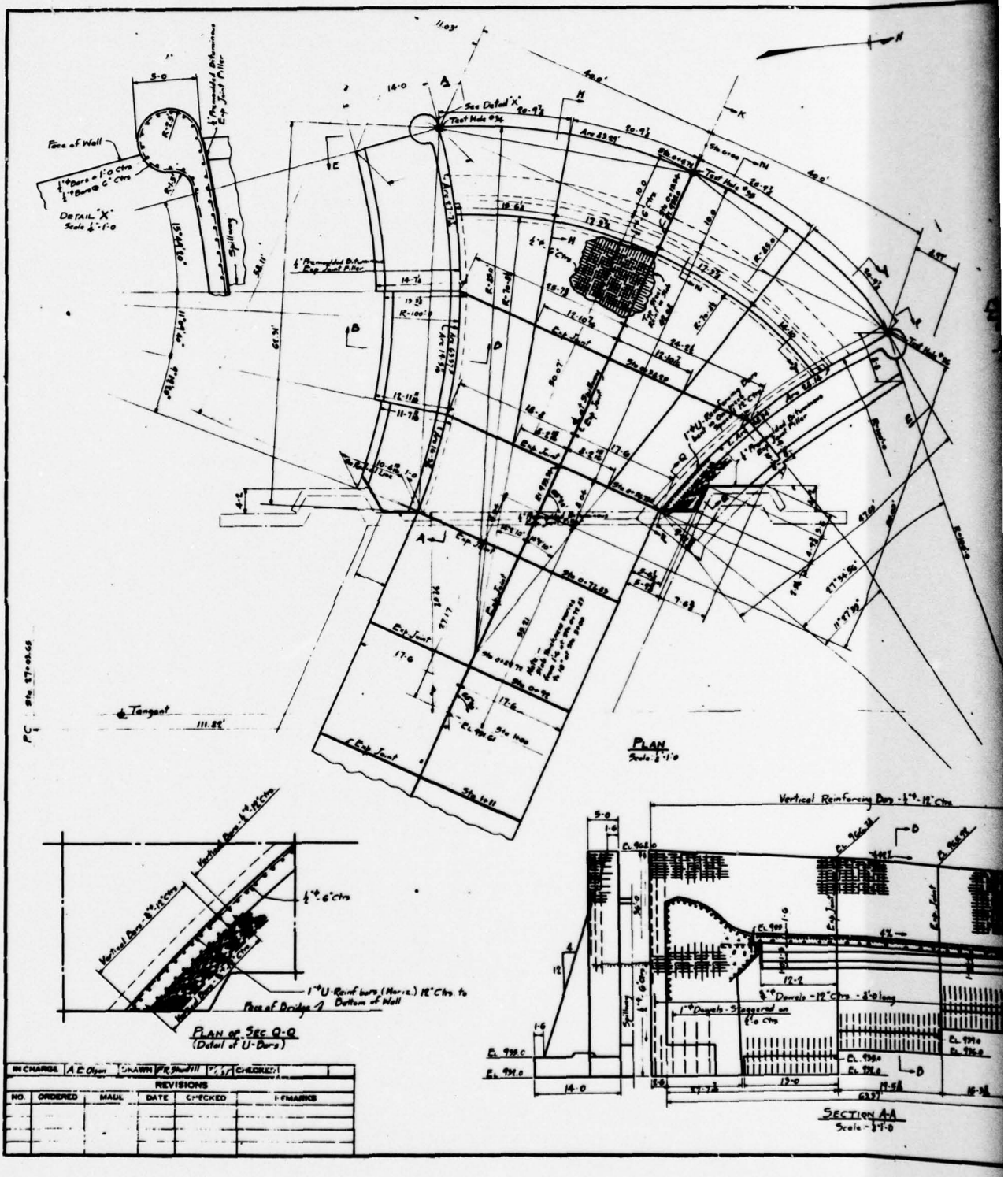
BABCOCK BOULEVARD
COREWALL
NORTH PARK DAM
NORTH PARK, McCANDLESS TOWNSHIP
SECTIONS & DETAILS
SCALES AS SHOWN JUNE 6, 1958
SHEET 2 OF 2 SHEETS

2

PLATE 4

D'APPOLONIA

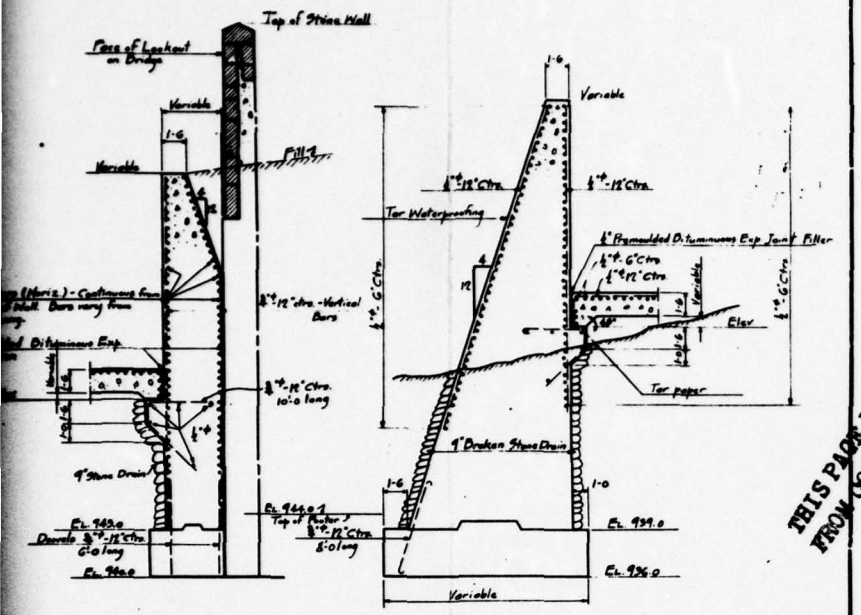
DRAWN BY	CHECKED BY		DRAWING NUMBER
RDB	BE	4-17-79	78-367-B92
1-4-79	APPROVED BY	4-17-79	



IN CHARGE	A.E. Olsen	DRAWN	P.K. Shadrill	TRACED	CHECKED

REVISIONS

NO.	ORDERED	MAUL	DATE	CHECKED	REMARKS



Estimated Quantities

Item	Description	Unit	Quantity
1-B	Concrete in Foundations	Cu Yds	500
2-B	Concrete in Spillway Weir	Cu Yds	690
3-B	Concrete in Spillway Bridge Wing Wall	Cu Yds	660
4-B	Concrete in Spillway Channel Walls	Cu Yds	890
5-B	Concrete in Spillway Channel Floor	Cu Yds	575
6-B	Reinforcing Steel (Dowels)	Lbs	90000
7-B	Tar Waterproofing	Sq Yds	1000
8-B	Stone Drain	Cu Yds	600
9-B	Excavation	Cu Yds	5000
10-B	Copper Flashing	Lbs	1700
11-B	Premoulded Bituminous Expansion Joint Filler	Sq Yds	400

APPROVED

DEPARTMENT OF PLANNING

PLANNING ENGINEER — DATE

COUNTY PLANNING COMMISSION

ENGINEER — DATE

DEPARTMENT OF PARKS AND AVIATION

DIRECTOR — DATE

DEPARTMENT OF HIGHWAYS BRIDGES & TUNNELS

DIRECTOR — DATE

COUNTY COMMISSIONERS

DATE

DATE

DATE

COUNTY OF ALLEGHENY
PITTSBURGH, PA.

BABCOCK BOULEVARD
SPILLWAY
NORTH PARK DAM
NORTH PARK, McCANDLESS TOWNSHIP
GENERAL PLAN OF WING WALLS
WEIR & ESTIMATED QUANTITIES
SCALES AS SHOWN — JUNE 6, 1935
SHEET 1 OF 4 SHEETS

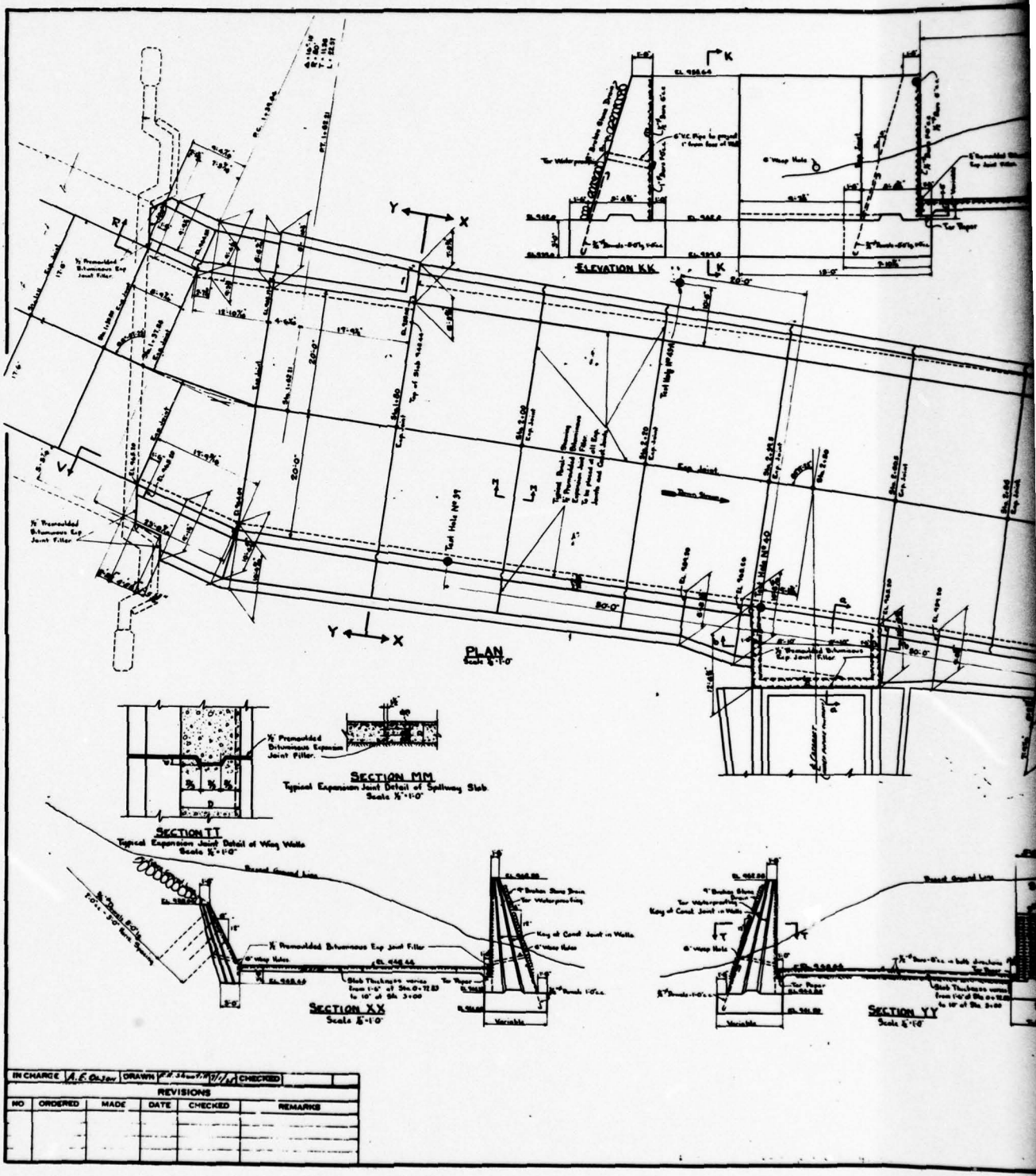
2

PLATE 5

D'APPOLONIA

2

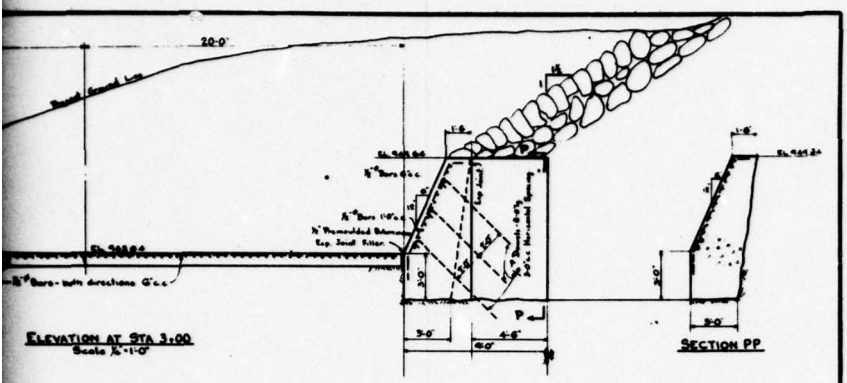
DRAWN BY	RDB	CHECKED BY	JSE	4-17-79	DRAWING NUMBER	78-367-B93
	1-4-79	APPROVED BY	[illegible]	4-17-79		



IN CHARGE	A.E. Ogden	DRAWN	[illegible]	CHECKED	

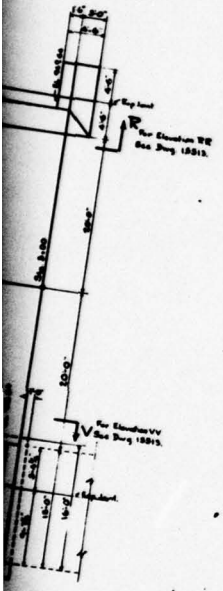
REVISIONS

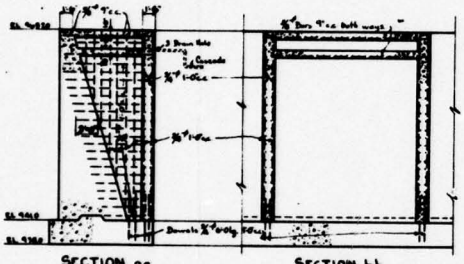
NO	ORDERED	MADE	DATE	CHECKED	REMARKS



ELEVATION AT STA 3:00
Scale ⅛"=1'-0"

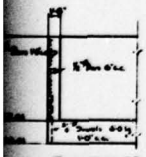
SECTION PP





SECTION aa
Scale ⅛"=1'-0"

SECTION bb
Scale ⅛"=1'-0"



ELEVATION SS

SUBMITTED JUNE 6, 1935

BRIDGE DESIGN ENGINEER

APPROVED

PLANNING ENGINEER

COUNTY OF ALLEGHENY
PITTSBURGH, PA.

BABCOCK BOULEVARD
SPILLWAY
NORTH PARK DAM
NORTH PARK, McCANDLESS TOWNSHIP
PAVING & SECTIONS OF SPILLWAY
SCALES AS SHOWN JUNE 6, 1935
SHEET 4 OF 4 SHEETS

2 PLATE 6

D'APPOLONIA

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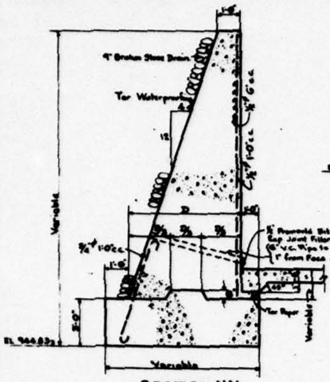
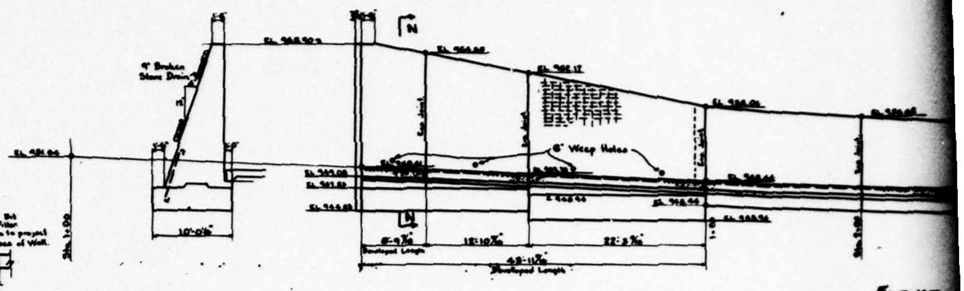
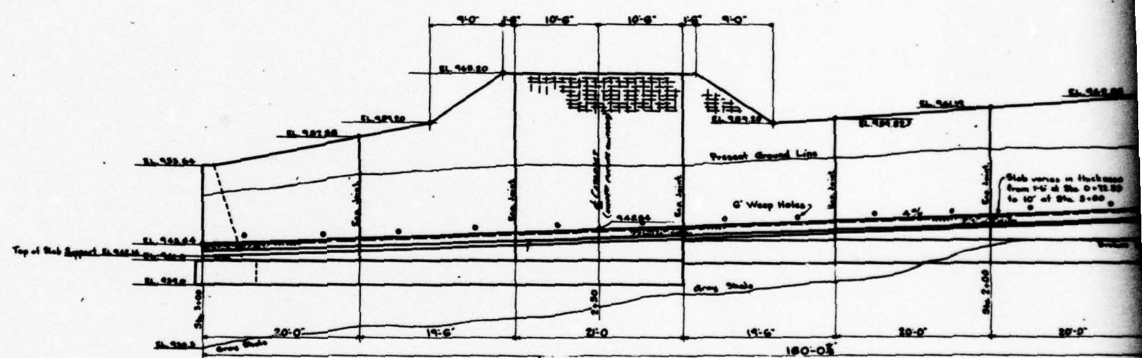
		APPROVED BY	4.17.79	78-367-B94



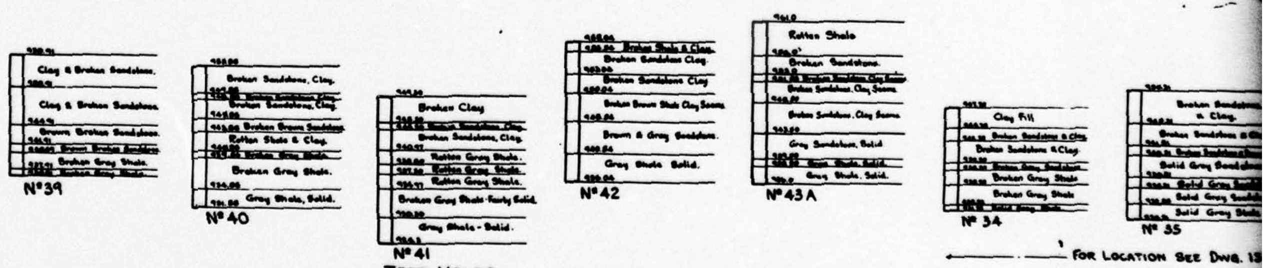
SECTION NN
Scale 3/4"=1'-0"



ELEVATION
FOR LOCATION



ELEVATION V-V
FOR LOCATION SEE DWG. 13514.



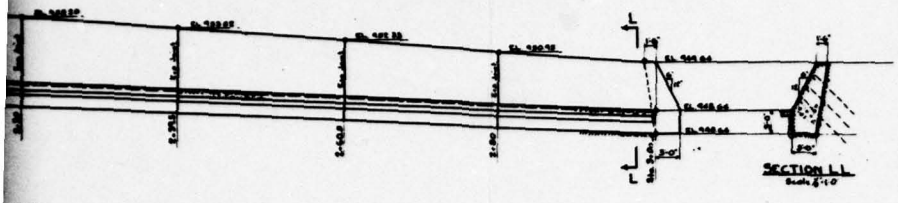
TEST HOLES
SCALE 1"=10'-0"
FOR LOCATION SEE DWG. 13514

FOR LOCATION SEE DWG. 13

IN CHARGE	A. E. Olson	DRAWN		CHECKED	

REVISIONS

NO.	ORDERED	MADE	DATE	CHECKED	REMARKS



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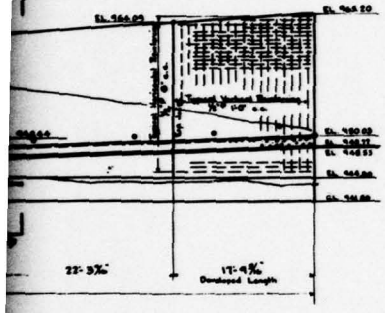
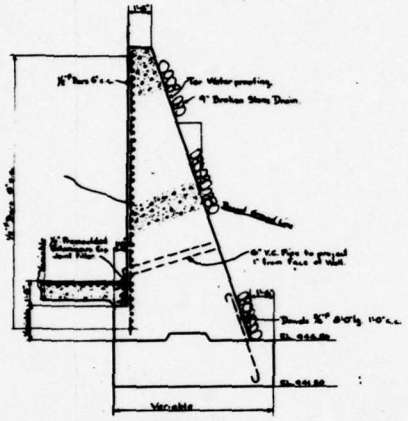
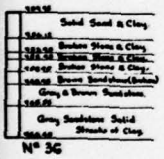




SECTION PP
Typical Section.
Scale 1/4"-1'-0"



N° 36

SUBMITTED JUNE 6, 1935

APPROVED

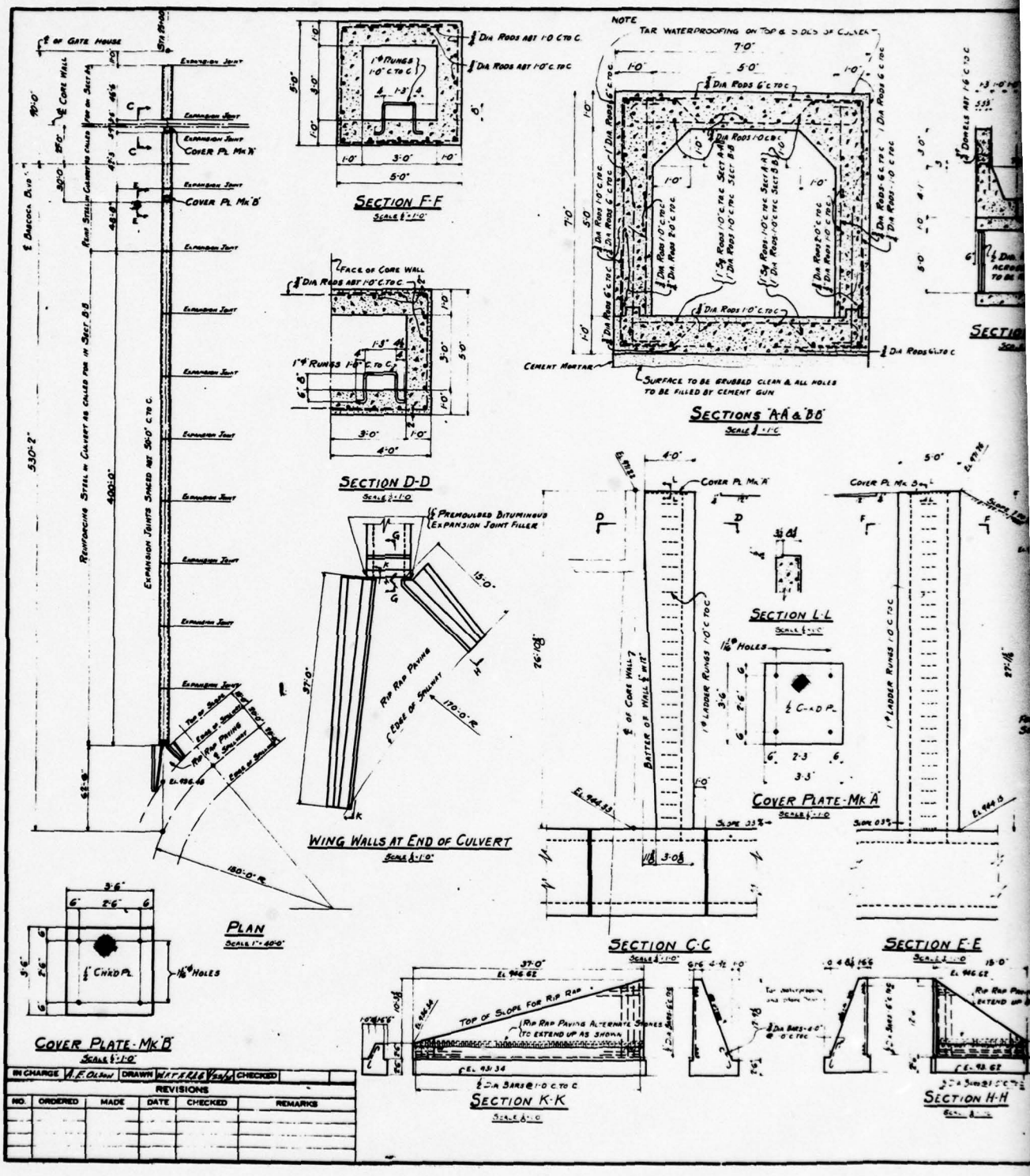
COUNTY OF ALLEGHENY
PITTSBURGH, PA.

BABCOCK BOULEVARD
SPILLWAY
NORTH PARK DAM
NORTH PARK, McCANDLESS TOWNSHIP
ELEVATIONS OF SPILLWAY CHANNEL
SCALES AS SHOWN JUNE 6, 1935
SHEET 3 OF 4 SHEETS

PLATE 7

D'APPOLONIA

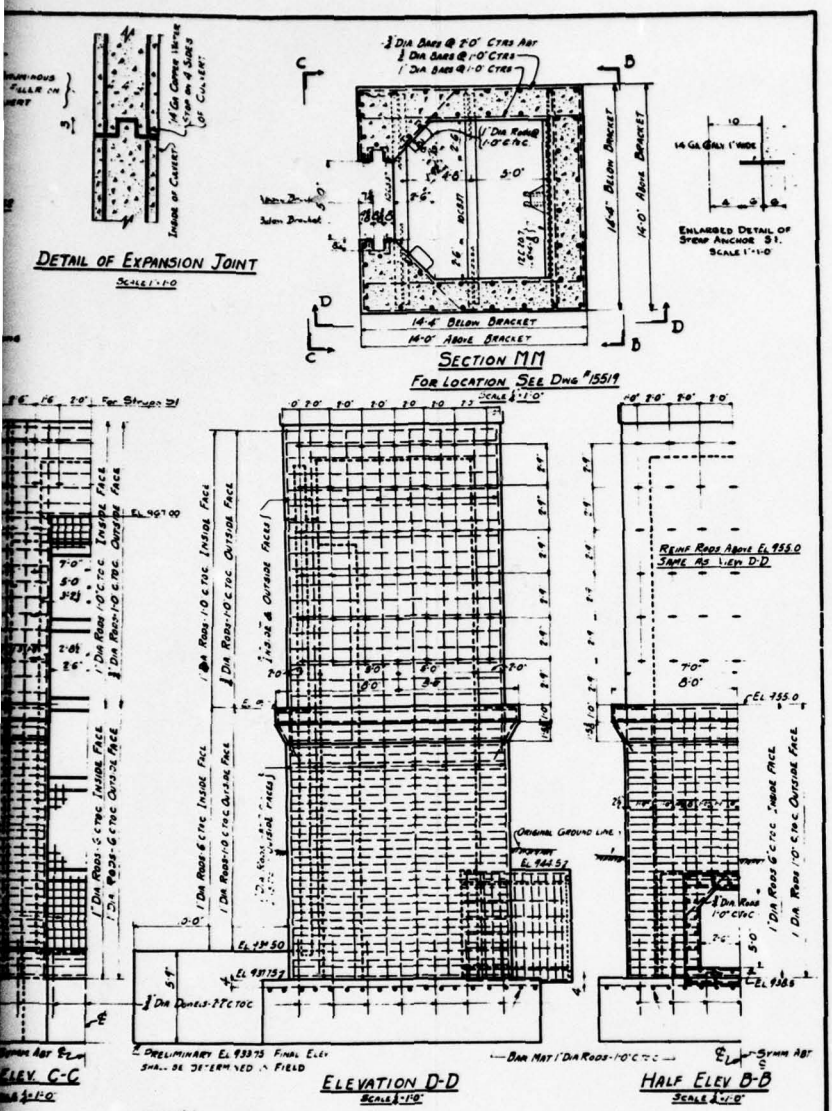
DRAWN BY	R D B	CHECKED BY	BE	4-17-79	DRAWING NUMBER	78-367-B95
	1-4-79	APPROVED BY	[illegible]	4.17.79		



IN CHARGE	V.F. OLSON	DRAWN	WITTER & Vasta	CHECKED	

REVISIONS

NO.	ORDERED	MADE	DATE	CHECKED	REMARKS



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COUNTY OF ALLEGHENY
PITTSBURGH, PA.

BABCOCK BOULEVARD
GATE HOUSE
NORTH PARK DAM
NORTH PARK, McCANDLESS TOWNSHIP
CULVERT & DETAILS
SCALES AS SHOWN JUNE 6, 1935
SHEET 2 OF 4 SHEETS

SUBMITTED JUNE 6, 1935

_____ ENGINEER DESIGN ENGINEER

APPROVED

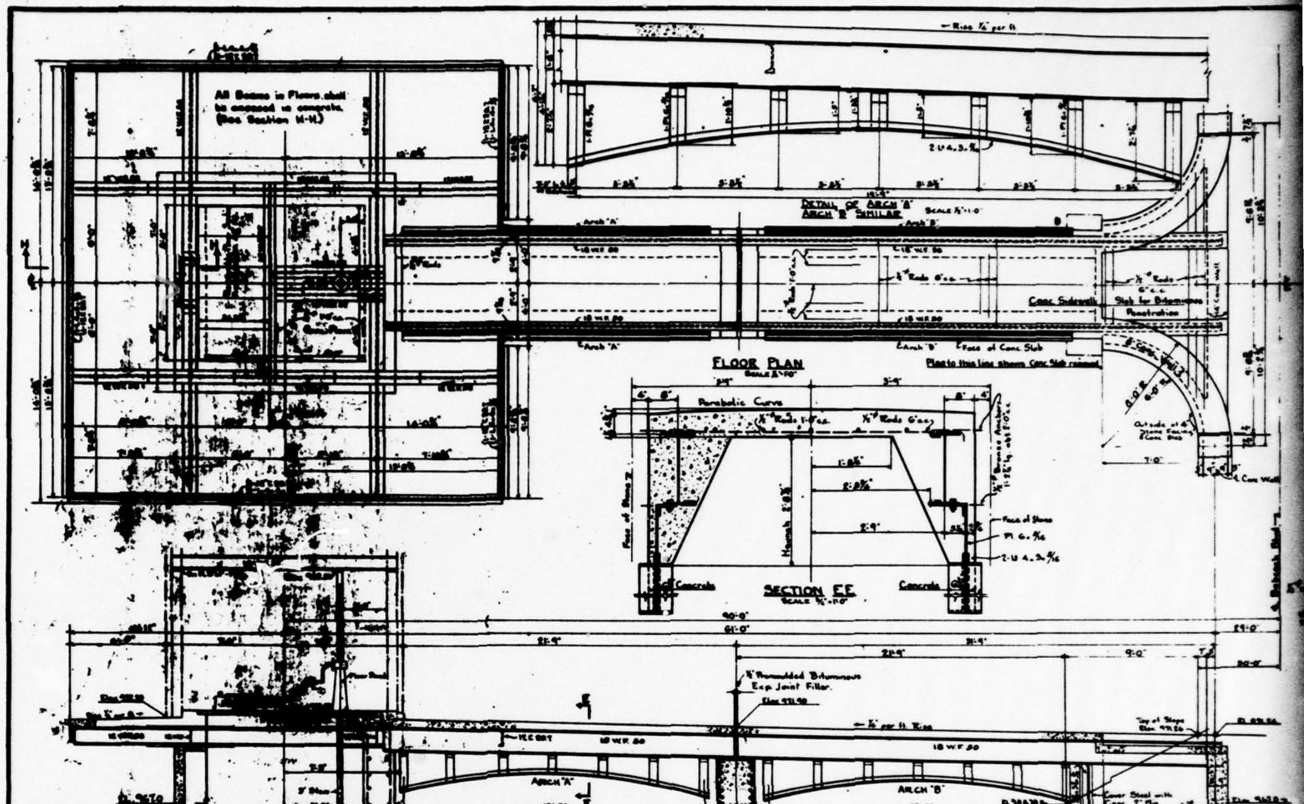
_____ PLANNING ENGINEER

2

PLATE 8

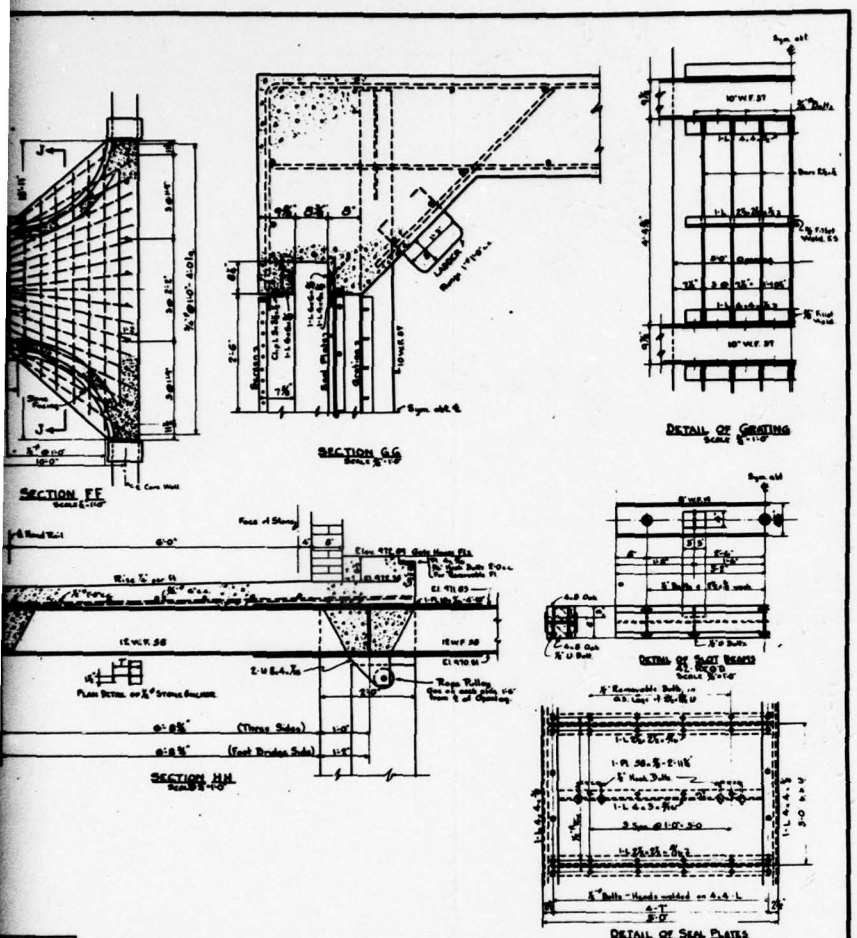
D'APPOLONIA

DRAWN BY	RDB 1-4-79	CHECKED BY	SE 4-17-79
APPROVED BY	4-17-79	DRAWING NUMBER	78-367-B96



ESTIMATED QUANTIT...

ITEM	DESCRIPTION
1B	CONCRETE IN FOUNDATIONS (INCLUD...
2B	CONCRETE IN WING WALLS (INCLUD...
3B	CONCRETE IN SLABS
4B	CONCRETE NOT INCLUDED IN ITEMS...
5B	REINFORCING STEEL INCLUDING DOW...
6B	STRUCTURAL STEEL (INCLUDING ...
7B	TAR WATERPROOFING.
8B	STONE DRAIN.
9B	12" EXTRA HEAVY WROUGHT IRON PIPE ...
10B	6" EXTRA HEAVY WROUGHT IRON PIPE ...
11B	COPPER FLASHING.
12B	PREMOULDED BITUMINOUS EXPANSION JOINT ...
13B	HAND RAILING - IN PLACE
14B	GATE & FIXTURES.
15B	ROPE PULLEY.
16B	LUMBER & MILLWORK
17B	ROOFING TILE
18B	BRICK
19B	ORNAMENTAL IRON & HARDWAR...
20B	STONE FACING (INCLUDING ANCHORS, MORTAR AND GROUT)
21B	GRID FLOOR - IN PLACE
22B	RAISED PATTERN REMOVABLE FLOOR S...



	QUANTITY
	250
	100
	55
	600
	250000
	55000
	1500
	15
	140
	200
	1700
	60
	200
	2
	600
	10
	4500
	110
	5

All work under This contract Shall Be Done In Accordance With The Standard Specifications for Construction of Steel Highway Bridges Issued Jan. 1, 1929, The Standard Specifications for Construction of Bridge Masonry, Floors, & Approaches, Dated March 1, 1928, The Standard Specifications for Paint Dated Jan. 1, 1928, And The Rules And Regulations of The Federal Government.

All material Shall Be Inspected By The Pittsburgh Testing Laboratory Welders Shall Be Qualified By The National Welding Bureau, And All Welding Equipment Shall Be Subject To Its Approval.

- GENERAL NOTES -

For General Plan & Elev. Of Gate House See Dwg. # 15521.
For Miscellaneous Details of Gate House See Dwg. # 15522.
Class "A" Concrete (1:2:4 Mix) For Item 1-B
Class "B" Concrete (1:2:3 Mix) For All Other Items
For Additional Information - See Supplemental Instructions To Bidders & Supplemental Specifications For Foundations Shown On Plans And Approved By The Director At His Discretion May Order Some Sub Ad A Lower Or Higher Elevation If Ground Conditions Warrant It. Plans & Details For Arch Centering, Structural Steel Framing, & Reinforcing Steel Shall Be Submitted For Approval By The Director.
All Sand Shall Meet The Special Requirements As Given By The Bureau Of Mines, Department Of Labor And Industry Of The Commonwealth Of Pennsylvania, Dated May 1, 1931, And Shall Be Subject To Such Tests As May Be Required By The Director.
All Sand Shall Meet The Requirements Of Section 703 (Paragraph 2 "SAND") Of The Standard Specifications. Sand To Be Used Face Mixed Shall Be Screened Through A No. 4 Sieve Before Mixing.
All Concrete Shall Be Mixed In A Mechanical Mixer Of A Type Approved By The Director. Concrete Shall Be Placed In Its Final Position Within One Hour After Mixing. Concrete Shall Be Deposited In Continuous Horizontal Layers Not Exceeding 12" In Depth And Shall Be Thoroughly Compacted By Spading And Tamping. Concrete Shall Not Be Placed In Water Unless Authorized By The Director. Concrete Shall Be Protected From Injury For Such Time As The Director May Direct. Concrete Shall Not Be Placed When The Temperature Is Below 35° F. Unless Authorized By The Director.
Random Ashlar On All Natural Bed, With ½" Mortar Joints.
For Location Of Dowels And Other Concrete Details See Drawings # 15520, 15521 & 15523.
The Contractor Shall Provide All Engineering & Inspection Facilities As Designated In Section 4-d Paragraph 4 "A" & "B" Of The Standard Contract For Construction Of Bridge Masonry, Floors, & Approaches, And Shall Provide An Approved Office & Telephone, And Shall Pay For All Telephone Calls.
Parts Of Members Which Are To Be Welded In The Field Shall Not Be Shop Painted.
All Structural Steel Which Is Embedded In Concrete Shall Not Be Painted.
All Steel Except As Noted Shall Have 2 Coats Of Paint :: Shop Coat Of ½ Red Lead, 1 Field Coat Of Pio Aluminum, & 1 Field Coat Of ½ Aluminum.
All Steel Shall Be Medium Open Hearth, Copper Bearing, Carbon Steel & Shall Conform To The A.S.T.M. Specifications Serial Designation A-7-36 (A-Bolts To Be 56" Unless Otherwise Noted).
Provide Methods Of Piping & Valves For The Director's Approval.

APPROVED

DEPARTMENT OF PLANNING
(Parke K. Martin) July 17 1935
DATE

COUNTY PLANNING COMMISSION
A. Copley July 17-1935
DATE

DEPARTMENT OF PARKS AND AVIATION
[illegible] 7-19-35
DIRECTOR DATE

DEPARTMENT OF HIGHWAYS BRIDGES & TUNNELS
Thos. O'Malley July 17 1935
DIRECTOR DATE

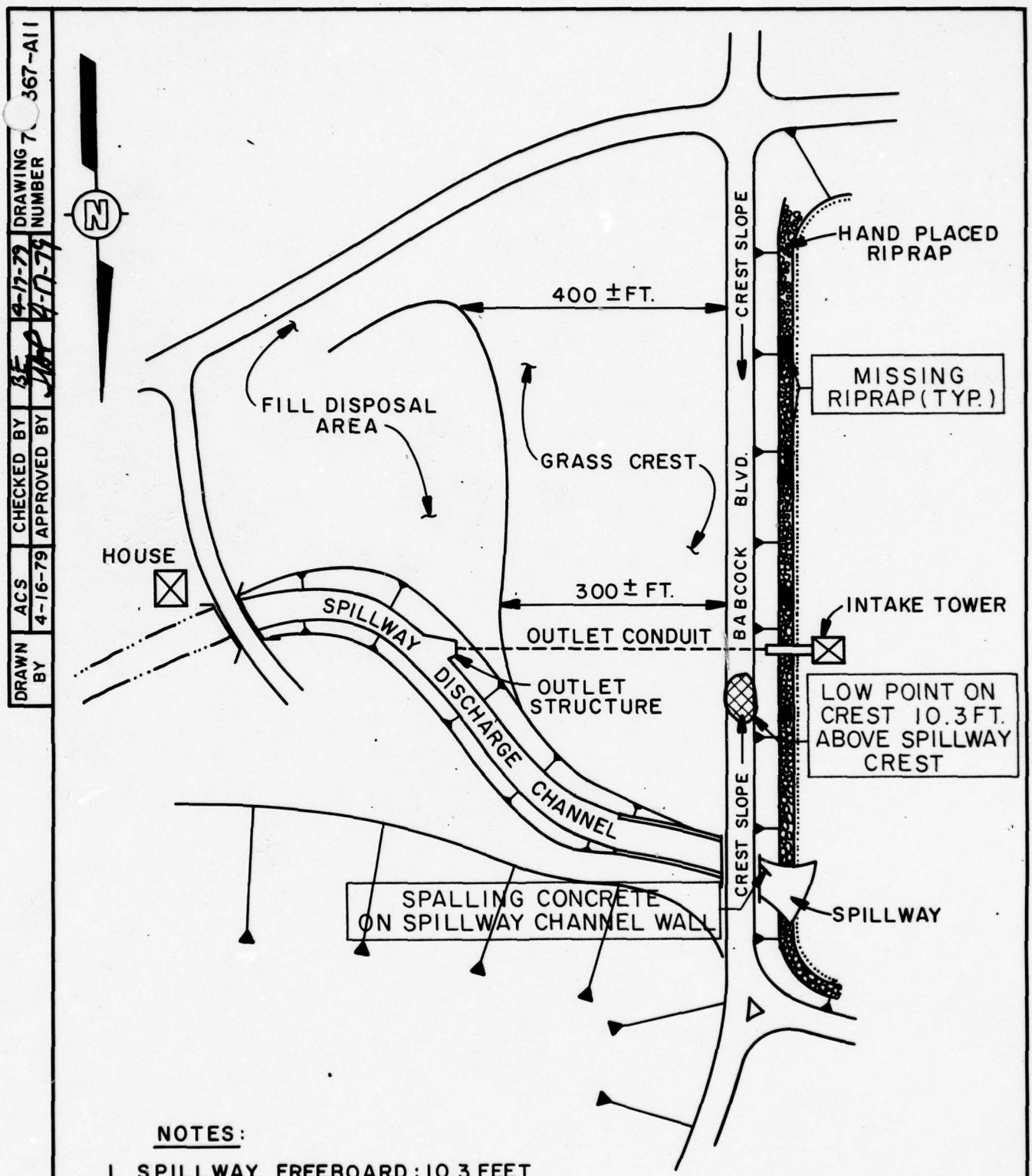
COUNTY COMMISSIONERS
DATE
[illegible] July 19 35
DATE
[illegible]
DATE

COUNTY OF ALLEGHENY
PITTSBURGH, PA.

BABCOCK BOULEVARD
GATE HOUSE
NORTH PARK DAM
NORTH PARK, Mc CANDLESS TOWNSHIP
GENERAL PLAN & ESTIMATED QUANTITIES
SCALES AS SHOWN JUNE 6, 1935
SHEET 1 OF 4 SHEETS

PLATE 9

D'APPOLONIA



NOTES:

1. SPILLWAY FREEBOARD: 10.3 FEET
2. POOL LEVEL DATE OF INSPECTION 0.2 ABOVE SPILLWAY CREST

PLATE 10

PINE CREEK DAM
GENERAL PLAN
FIELD INSPECTION NOTES
FIELD INSPECTION DATE: 12-15-79

D'APPOLONIA

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

NAME OF DAM Pine Creek Dam COUNTY Allegheny STATE Pennsylvania NDI I.D. PA-467 ID# DER I.D. 2-26

TYPE OF DAM Earth HAZARD CATEGORY High

DATE(S) INSPECTION December 15, 1978 WEATHER Sunny TEMPERATURE 30s

POOL ELEVATION AT TIME OF INSPECTION 960.2 M.S.L. TAILWATER AT TIME OF INSPECTION 936± M.S.L.

INSPECTION PERSONNEL:	REVIEW INSPECTION PERSONNEL: (April 16, 1979)
Bilgin Erel	L. D. Andersen
Wah-Tak Chan	J. H. Poellot
	B. Erel

Bilgin Erel RECORDER

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	As designed, the crest of the dam is on descending grades between the right and left abutments to a low spot near the left abutment. The low spot is 10.3 feet above the spillway crest level.	
RIPRAP FAILURES	Most of the riprap is in good condition. There are areas of missing riprap.	The missing riprap should be replaced.

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No signs of distress.	
ANY NOTICEABLE SEEPAGE	None.	
STAFF GAGE AND RECORDER	None.	
DRAINS	None.	

VISUAL INSPECTION
PHASE I
OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The outlet conduit is not accessible for inspection. Only the downstream end was visible. No distress was observed.	
INTAKE STRUCTURE	Submerged.	
OUTLET STRUCTURE	Outlet conduit would directly discharge into the spillway discharge channel.	
OUTLET CHANNEL	No obstructions in the outlet channel that would significantly affect discharge capacity of the outlet works.	
EMERGENCY GATE	Park personnel reported that the outlet conduit sluice gate has not been operated in the recent past. Due to a siltation problem in the reservoir, the operational condition of the outlet conuit sluice gate was questionable. Operation of the gate was not observed.	Operational condition of the outlet conduit sluice gate should be evaluated and necessary maintenance performed.

VISUAL INSPECTION
PHASE I
UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	83-foot-wide concrete ogee weir. In good condition.	
APPROACH CHANNEL	Submerged. Appears to be free of debris.	
DISCHARGE CHANNEL	Rectangular concrete channel. In good condition.	
BRIDGE AND PIERS	A single-span bridge crosses the spillway discharge channel approximately 70 feet downstream from the overflow section.	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A.	
APPROACH CHANNEL	N/A.	
DISCHARGE CHANNEL	N/A.	
BRIDGE PIERS	N/A.	
GATES AND OPERATION EQUIPMENT	N/A.	

VISUAL INSPECTION
PHASE I
INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

VISUAL INSPECTION
PHASE I
RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Gentle.	
SEDIMENTATION	Park personnel reported that the reservoir receives significant sediment load from the reservoir and the storage capacity of the reservoir has been reduced to one third.	
UPSTREAM RESERVOIRS	Marshall Lake Dam which impounds a reservoir with a surface area of about 12 acres is located immediately upstream of the Pine Creek Dam reservoir. The storage capacity of the Marshall Lake Dam is reported to be approximately 60 acre-feet.	

VISUAL INSPECTION
PHASE I
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No apparent obstructions immediately downstream from the dam that would affect the discharge capacity of the spillway.	
SLOPES	No apparent instability (immediately downstream from the dam).	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Over most of its course, Pine Creek flows through urban, residential, and commercial areas. Population: Over 1000 (estimated).	

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
AND HYDROLOGIC AND HYDRAULIC
PHASE I

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Pine Creek Dam

ID# NDI I.D. No. PA-467
DER I.D. No. 2-26

ITEM	REMARKS
AS-BUILT DRAWINGS	The design drawings are available in state files.
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	The dam was designed by Allegheny County personnel during 1935. It was constructed by Harrison Construction Company of Pittsburgh, Pennsylvania, under the WPA program with completion in 1936.
TYPICAL SECTIONS OF DAM	See Plates 2 and 3.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See Plates 8 and 9.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	Not available.
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Not available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	See Plate 4.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None reported.
BORROW SOURCES	Unknown.
MONITORING SYSTEMS	None.
MODIFICATIONS	Downstream side of the embankment has been filled over the years and presently the crest of the dam is over 300 feet wide.
HIGH POOL RECORDS	Not recorded.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None reported.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported.
MAINTENANCE OPERATION RECORDS	Not available.
SPILLWAY PLAN SECTIONS DETAILS	See Plate 5.
OPERATING EQUIPMENT PLANS AND DETAILS	See Plate 9.

CHECKLIST
ENGINEERING DATA
HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 25 square miles (suburban residential areas)

ELEVATION; TOP NORMAL POOL AND STORAGE CAPACITY: 960 (570 acre-feet)

ELEVATION; TOP FLOOD CONTROL POOL AND STORAGE CAPACITY: 970.3 (950 acre-feet)

ELEVATION; MAXIMUM DESIGN POOL: 970.3

ELEVATION; TOP DAM: 970.3 (measured low spot)

SPILLWAY:

a. Elevation 960

b. Type Ogee

c. Width 83 feet (perpendicular to flow)

d. Length N/A

e. Location Spillover Low spot on crest near left abutment

f. Number and Type of Gates None

OUTLET WORKS:

a. Type 5-foot by 5-foot reinforced concrete conduit

b. Location About 300 feet from left abutment

c. Entrance Inverts 938.5

d. Exit Inverts 936.5

e. Emergency Draindown Facilities Outlet conduit

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location None

c. Records None

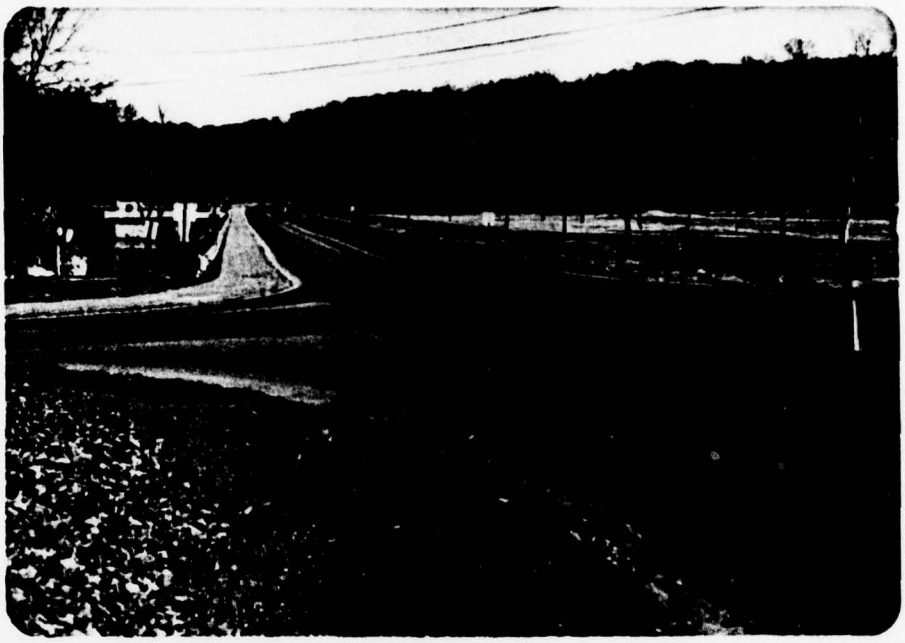
MAXIMUM NONDAMAGING DISCHARGE: Spillway capacity

APPENDIX C

PHOTOGRAPHS

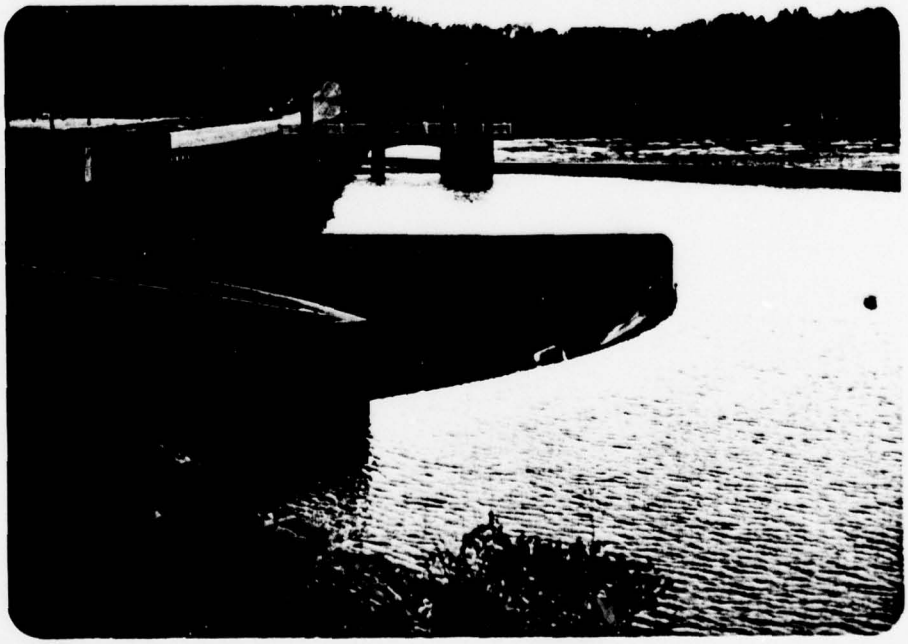
LIST OF PHOTOGRAPHS
PINE CREEK DAM
NDI I.D. NO. PA-467
DECEMBER 15, 1978

PHOTOGRAPH NO.	DESCRIPTION
1	Crest (looking north).
2	Spillway crest (looking south).
3	Spillway discharge channel.
4	Outlet works control tower.
5	Outlet conduit sluice gate hoist.
6	Downstream end of outlet conduit.
7	Erosion on upstream face riprap.
8	Deteriorating concrete. Right side of spillway discharge channel under bridge.



Photograph No. 1

Crest (looking north).

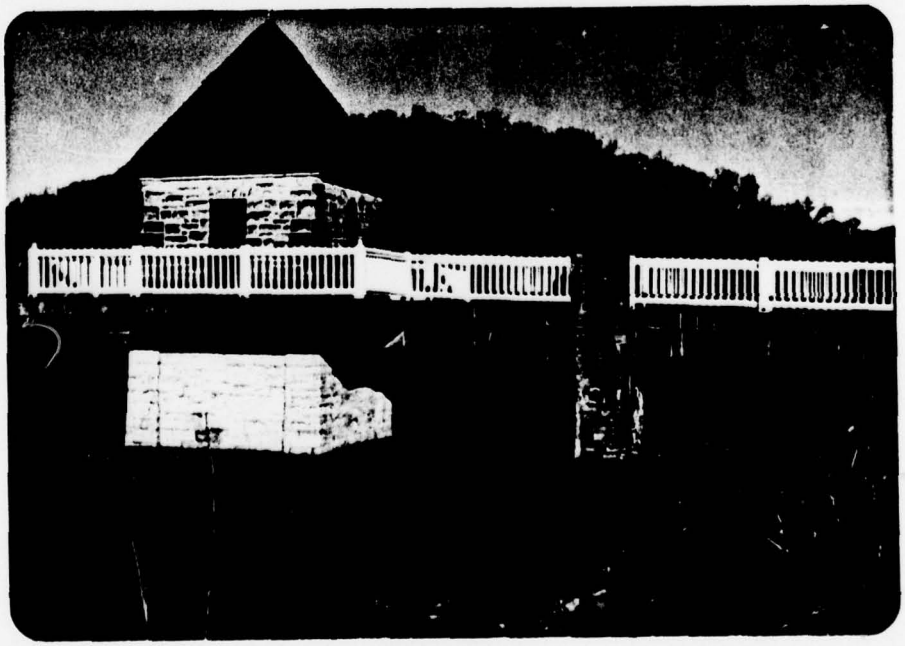


Photograph No. 2

Spillway crest (looking south).

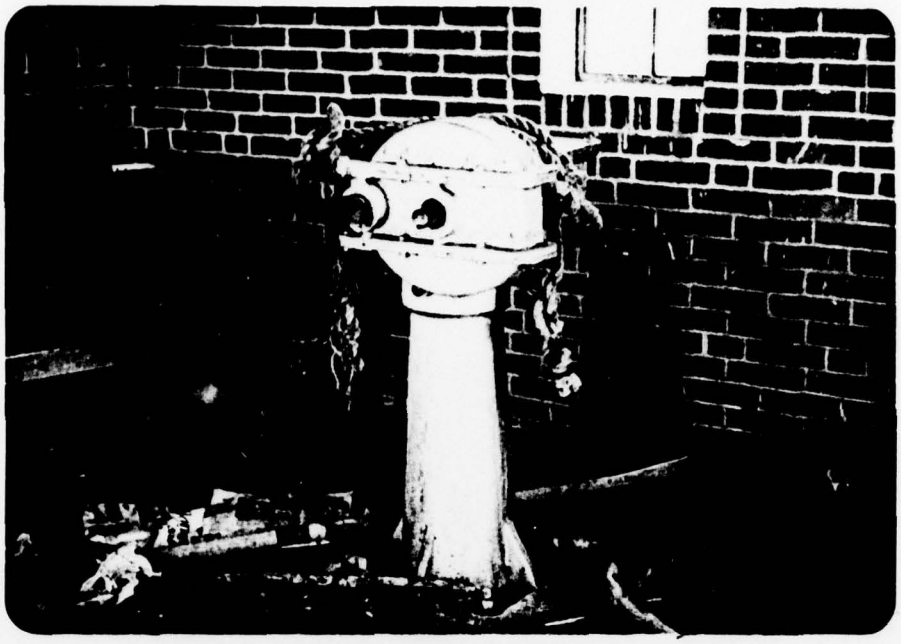
Photograph No. 3

Spillway discharge channel.



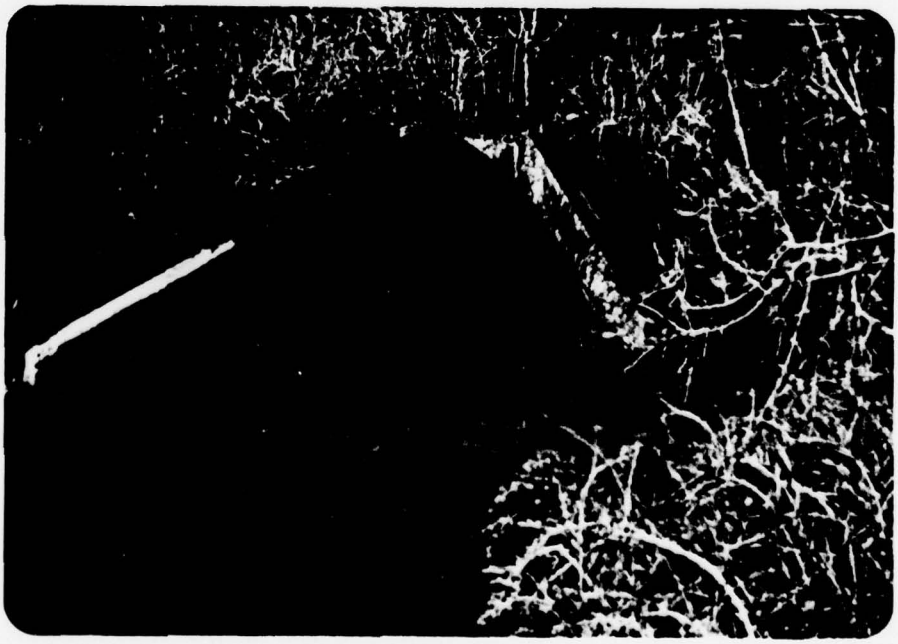
Photograph No. 4

Outlet works control tower.



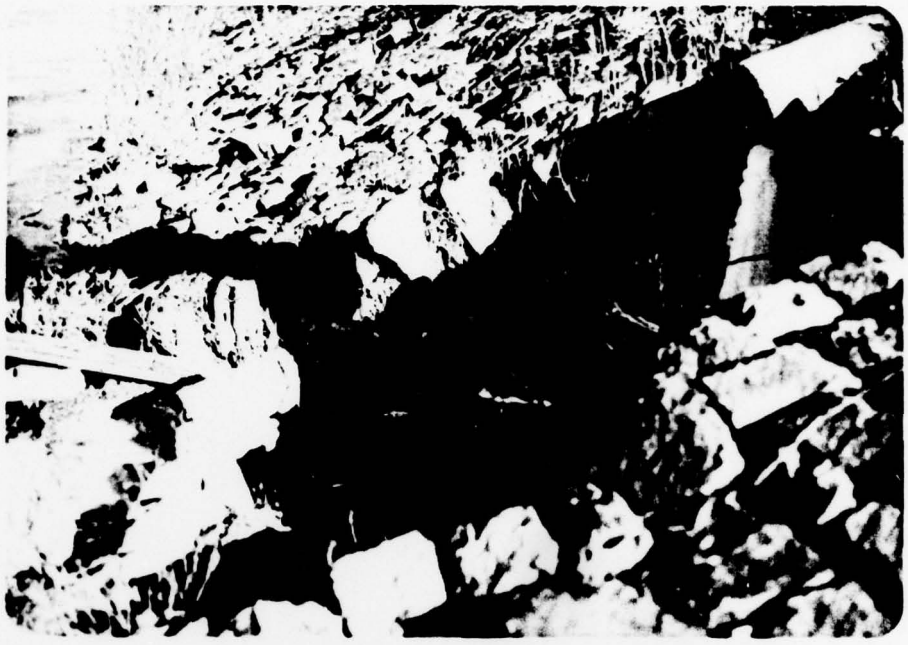
Photograph No. 5

Outlet conduit sluice gate hoist.



Photograph No. 6

Downstream end of outlet conduit.



Photograph No. 7

Erosion on upstream face riprap.

Photograph No. 8

Deteriorating concrete. Right side of spillway discharge channel under bridge.

APPENDIX D
CALCULATIONS

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Pine Creek (NDI I.D. PA-467)

PROBABLE MAXIMUM PRECIPITATION (PMP) = 24.0 INCHES/24 HOURS[1]

STATION	1	2	3	4	5
Station Description	North Hill Lake	Pine Creek Dam			
Drainage Area (square miles)	25.0	0			
Cumulative Drainage Area (square miles)	25.0	25.0			
Adjustment of PMF for Drainage Area (%)[2]					
6 Hours	93	-			
12 Hours	111	-			
24 Hours	121	-			
48 Hours	131	-			
72 Hours	-	-			
Snyder Hydrograph Parameters					
Zone[3]	24	-			
C_p/C_t[4]	0.45/1.6	-			
L (miles)[5]	7.2	-			
L_{ca} (miles)[5]	4.0	-			
$t_p = C_t(L \cdot L_{ca})^{0.3}$ (hours)	4.4	-			
Spillway Data					
Crest Length (ft)	-	83.3			
Freeboard (ft)	-	10.3			
Discharge Coefficient	-	3.8			
Exponent	-	1.5			

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION   26 FEB 79
**********
    1                A1       SNYDER UNIT HYDROGRAPH,FLOOD ROUTING AND DAM OVERTOPPING ANALYSES
    2                A2       PINE CREEK DAM,ALLEGENY COUNTY,NDI-ID.PA467          PROJECT NO.78-367-11
    3                A3       FOR 20%,30%,40%,50%,60%,70%,80%,90%,AND 100% PMF
    4                R    500          0       30        0        0                0        0       -4        0
    5                B1     5
    6                J      1        9       1
    7                J1   0.20     0.30    0.40     0.50     0.60     0.70     0.80     0.90     1.00
    8                K      0        1                                           1
    9                K1       CALCULATION OF INFLOW HYDROGRAPH TO NORTH PARK LAKE,NDI-ID.PA467
   10                M      1        1    25.0                25.0                                    1
   11                P              24.0    93.2    110.6    120.8    131.2
   12                I                                                        1.0     0.05            0.0045
   13                W    4.37     0.45
   14                X   -1.0     -0.05     2.0
   15                K      1        2                                           1
   16                K1       ROUTING FLOW THROUGH PINE CREEK DAM,NDI-ID.PA467
   17                Y                                        1        1
   18                Y1     1                                                567.0
   19                SS     0.0    567.0   1949.0   4199.0
   20                SE   938.0    960.0    970.8    980.0
   21                SS   960.0     83.3      3.8      1.5
   22                SD   970.3      2.65     1.5   1000.0
   23                SL   200.0    400.0    600.0    800.0   1100.0
   24                SV   970.3    971.0    972.0    973.0    974.0
   25                K     99
```

COMPUTER INPUT OVERTOPPING ANALYSIS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1 .20	RATIO 2 .30	RATIO 3 .40	RATIO 4 .50	RATIO 5 .60	RATIO 6 .70	RATIO 7 .80	RATIO 8 .90	RATIO 9 1.00
HYDROGRAPH AT	1	25.00	1	5843.	8764.	11686.	14607.	17529.	20450.	23372.	26293.	29215.
		(64.75)		(165.46)(	248.18)(	330.91)(	413.64)(	496.37)(	579.09)(	661.82)(	744.55)(	827.28)
ROUTED TO	2	25.00	1	5383.	8202.	11157.	14015.	17013.	20090.	23090.	26045.	28979.
		(64.75)		(152.43)(	232.26)(	315.92)(	396.86)(	481.74)(	568.89)(	653.83)(	737.52)(	820.59)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	960.00	960.00	970.30
STORAGE	567.	567.	1885.
OUTFLOW	0.	0.	10464.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	966.61	0.00	1413.	5383.	0.00	45.50	0.00
.30	968.76	0.00	1688.	8202.	0.00	45.00	0.00
.40	970.65	.35	1930.	11157.	2.00	45.00	0.00
.50	971.59	1.29	2142.	14015.	5.50	45.00	0.00
.60	972.27	1.97	2308.	17013.	7.50	45.00	0.00
.70	972.83	2.53	2445.	20090.	9.50	44.50	0.00
.80	973.29	2.99	2557.	23090.	11.00	44.50	0.00
.90	973.69	3.39	2655.	26045.	12.00	44.50	0.00
1.00	974.05	3.75	2743.	28979.	13.00	44.50	0.00

OVERTOPPING ANALYSIS SUMMARY

APPENDIX E

REGIONAL GEOLOGY

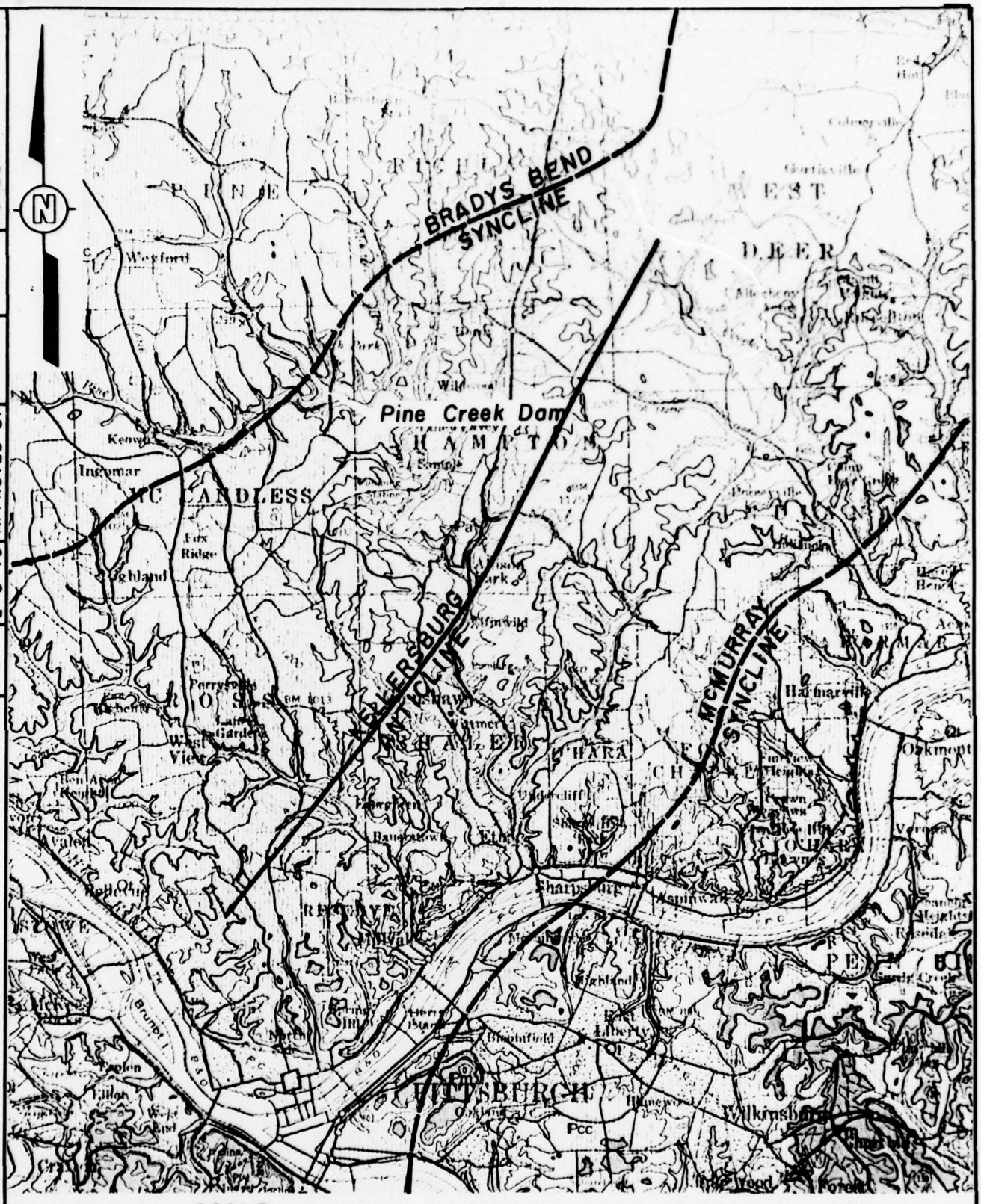
APPENDIX E
REGIONAL GEOLOGY

Pine Creek Dam and the associated North Park Lake are located just east of the crest of the north-northeast trending Bradys Bend Syncline. The strata dip approximately 60 feet per mile to the east and consist of the lower portion of the Conemaugh Group (Pennsylvanian Age).

The strata consist of interbedded shales, claystones ("red bed" material), and sandstone with a few coal and limestone seams. The strata in the slopes above the reservoir consist of "red bed" claystone with the Pine Creek Limestone seam located at the base of the rock layer. The Pine Creek Limestone is thin but may be susceptible to solutioning. The Buffalo Sandstone, a 30- to 40-foot seam, is located below the Pine Creek Limestone. Below the sandstone seam is interbedded limestone, claystone, and the Brush Creek coal seam. The stratum below the Brush Creek coal is the Mahoning Sandstone, a seam of interbedded sandy shale and sandstone approximately 100 feet thick. Below the Mahoning Sandstone is the Upper Freeport coal seam.

The Upper Freeport coal seam, which is located approximately 270 feet below the dam, is reported to have been mined east of the dam almost to the site. Surface subsidence due to mining has been reported in an area southeast of the dam.

The slopes above the reservoir are considered to be susceptible to shallow landsliding and soil creep due to the presence of "red bed" claystone weathering to a low strength material. However, major landslides which may significantly affect the storage volume of the reservoir are not considered to be likely.



DRAWN BY: ACS 2-5-79
CHECKED BY:
APPROVED BY:
DRAWING NUMBER 78-307-A20

SCALE

0 1 2 3 4 5 miles

PINE CREEK DAM
GEOLOGY MAP

REFERENCE:

GREATER PITTSBURGH REGION GEOLOGIC MAP
COMPILED BY W.R. WAGNER, J.L. CRAFT, L. HEYMAN
AND J.A. HARPER, DATED 1975, SCALE 1:125000

DAPPOLONIA

DRAWN BY	ACS	CHECKED BY	BE	2-6-79	DRAWING NUMBER 7 367-A22
	2-5-79	APPROVED BY	[illegible]	2.8.79	

GROUP	FORMATION		DESCRIPTION
	Alluvium	Qt	Sand, gravel, clay.
	Terrace deposits		Sand, clay, gravel on terraces above present rivers; includes Carmichaels Formation.
DUNKARD	Greene		Cyclic sequences of sandstone, shale, red beds, thin limestones and coals.
DUNKARD	Washington	Pw	Cyclic sequences of sandstone, shale, limestone, and coal; contains Washington coal bed at base.
DUNKARD	Waynesburg	PPw	Cyclic sequences of sandstone, shale, limestone and coal; contains Waynesburg coal bed at base.
MONONGAHELA		Pm	Cyclic sequences of shale, limestone, sandstone and coal; contains Pittsburgh coal bed at base.
P: CONEMAUGH	Casselman	Pcc	Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.
P: CONEMAUGH	Ames		
P: CONEMAUGH	Glenshaw	Pcg	Cyclic sequences of sandstone, shale, red beds and thin limestone and coal; several fossiliferous limestone; Ames limestone bed at top.
ALLEGHENY	Vanport		Cyclic sequences of shale, sandstone, limestone, and coal; contains Brookville coal at base and Upper Freeport coal at top; within group are the commercial Vanport limestone and Kittanning and Clarion coals.
ALLEGHENY		Pa	

GEOLOGY MAP LEGEND

REFERENCE:

GREATER PITTSBURGH REGION GEOLOGIC MAP
COMPILED BY W.R. WAGNER, J.L. CRAFT, L. HEYMAN
AND J.A. HARPER, DATED 1975, SCALE 1:125000